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Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Editor*

Editorial Office: 1155 16th Street, N. W., Washington 6, D. C.

VOLUME XXXII NO. 8

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Autumn Foliage

Better Crops with PLANT FOOD

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Vol. XXXII WASHINGTON, D. C., OCTOBER 1948 No. 8

One renews memories when . . .

Once A Grandpa

Jeff McDermid

AFTER you grow accustomed to being a Grandpa it is not so difficult as it sounds when the startling news first reaches you. The worst part is having it happen before you have had time to take stock of your capacity in that respect, or have enrolled in a suitable preparatory course which would familiarize you and indoctrinate you with the subtle duties that belong to that degree.

When the probably anticipated message arrives that your own offspring has reproduced itself you feel like the cattle owner who has won a mere championship and then finds they have awarded him the grand championship to boot. You have been well inaugurated as a Dad, having had that title for several years, but the added prefix which comes with the advent of the grandchild has a peculiar feeling all its own.

I have been a Grandpa now for one year, and it has come to me only once. I am therefore in no adequate position to chart a course for hopefuls compared to the other numerous "ancient" guys who regard this honor by this time with blasé indifference, owing to their having a multiplicity of progeny one generation removed.

At any rate it has helped me to grow somewhat more resigned to rattling false teeth, strange creaking and stiffness of the joints, and deeper wrinkles to steer the razor over. The fair, firm

skin of the grandchild and the buoyant energy of its vibrant body makes me think in a philosophical way of the fresh new leaf that pushes the dry and useless one to the ground after a hard winter. In other words, I am sustained by the evidence that there is a strong current of continuity in the family bloodstream that will probably carry on without artificial stimulation well into the twenty-first century.

There was a time when the most potent, illustrious, and august degree of Grandpa was conferred mostly upon men in their prime, as the result of early marriage and quick production of plentiful offspring. It was not unusual for a man to marry before his majority and to attain the Grandsire title in his early forties, so that he was in a position to boast of being a Grandpa before he reached the milestone of three score years. Unfortunately, the death rate then was much higher and good longevity not so pronounced as it is now, much to the disadvantage of braggarts inclined to super-paternal boasting.

THE high cost of living undoubtedly cuts down the crop of Grandpas under peacetime conditions. This makes each one of the child prodigies more selective and valuable. But under the turmoil of wartime, the Grandpa output grew apace, and guys who never imagined they would land in this division so soon were promoted pronto by the old biological rule of race survival. The war also gave the Grandpas a lot more work to do than they usually have in normal times. When you must be the head of two or more expanding households instead of one which is declining, things get a bit thicker. Under such stress a Grandpa means more to a child than just something to make monkeyshines with on rainy days.

But I see by the latest charts that the supercharged birthrate of recent years has begun a slow but sure backward dip, and the diaper supply is not such a dreadful shopping problem. Whether the cause of this is higher family expenses or whether the poor farmer and his support prices can be charged with the blame for a baby decline is not for me to answer. It's just another one of those impossible "Grandpa" questions—too tough to solve by instant thinking.

Howsomever that may be, we've got quite a job on our hands to fetch up the extra kiddies who joined this world of woe during the turbulent war years just past. Hence we must guard our Grandpa crop from delinquency and hold them fast to the straight and narrow path of duty. They must gird themselves for the strife as though there were no fond parents to advise them on the sanest rules for raising the infant coterie. You need not trouble yourselves about training the Grandma contingent meanwhile, as they just keep right on at their knitting and are never known to spoil a single childish whim. No books need ever be written about How to Be a Good Grandma. Save your wind and oratory for sires.

Grand paternity in my own immediate family has a rather odd quirk to it. I never saw but one of the grandparents out of the four nature allotted to me, and my own parents likewise never had the joy of knowing their own grandsires or grandams. My paternal Granddad was born 100 years before I was, and the one on my maternal side would have been 92 at my birth. Thus I had no help from my parents or personal experience as a child to teach me how to wheedle or bluff things through with these elders, or how to resist juvenile finagling aimed at the old armchair in the chimney corner.

LIKEWISE I wholly missed out on the hoary tales of the grandparents, redolent of pioneering and deprivations, strange wild critters and even wilder neighbors. Some of their folklore reached me thinned out and adjusted by parental communication, but it lacked the snap and the verve of firsthand recital. I am thus left without training or skill in the invention of whoppers and blood-chillers to use when bedtime

draws nigh. I am obliged to call upon the handy radio chains for this link with the ghostly and murderous past.

Naturally, a bit later when the grandchildren can read and study current literature for themselves, the magazine racks are conveniently supplied with all variety of colored comics and wonder-boys to whet their appetites for chivalry and worse. So the perplexed Grandsire is not entirely left to his own scant resources for juvenile amusement and education in citizenship.

From this inadequate background (deprived of graybeard wisdom and traditional cozening) I realize that one can live and thrive as well without a Grandpa as though he had enjoyed this natural perquisite from teething era to wedding-ring time. That is, a Granddad is by no means necessary for the present welfare of the baby, albeit he really had a mission worth while in the first place. This brings you down to solid earth and stops you from being too conceited about it.

It is this consciousness that consoles me in my amateur attempts to perform the rituals of the ancient order, because I know that if it is possible for a kid to get along with absolute zero in Grandpas it is not going to make so much difference if my young offspring has only a decimal fraction of a Grandpa to rely upon. By the time she is old enough to be discriminating in the choice of a Grandpa, the men of her own age basking beside her in the moonlight will eclipse the wavering rays from a dim and distant "star" which is almost set.

Yet my own task in trying to measure up to one grandchild is a slight one beside the work that is cut out for the prolific sire who has defied the traditions of the times and can claim a dozen or more upstarts around his knees. He must parcel out his talents mighty thin, and there are rare times no doubt when he wishes nature had not been so indulgent with him and he could find a nice dark hole and crawl into it for a "long winter's nap."

One of my neighbors belongs in this class of overly gifted progenitors. He usually has two or three of the youngsters visiting his domicile constantly. During the holidays the whole kaboodle arrives to make merry with him —while he is able to sit up and take it. I used to read those enchanting tales about sleigh bells and snow, and "going home to Grandpa," and such throbbing sentimentality, and wonder why in thunder no such bonanza came my way. After a few weeks this season with just one young chick under my wing, I can discern the reason why my neighbor of the multiple offspring wears a haunted look. He finds it hard to live down his potent past.

IT has been said that the chief privilege of being a Grandpa is the opportunity to relive the charming interval of original parenthood. True, it is a trifle more remote and secondary, and lacks quite the sharp element of proud potency and vainglory of the first experience. Yet it is indeed a revival time for long lost moments and pleasant incidents, with some restoration of old nostalgic activity and a wakening of a dormant spirit of play.

Things that were formerly shadowy memories return to please or plague you, and when you have spent a day's round of hours with the tiny hopeful, the experience makes you admire your

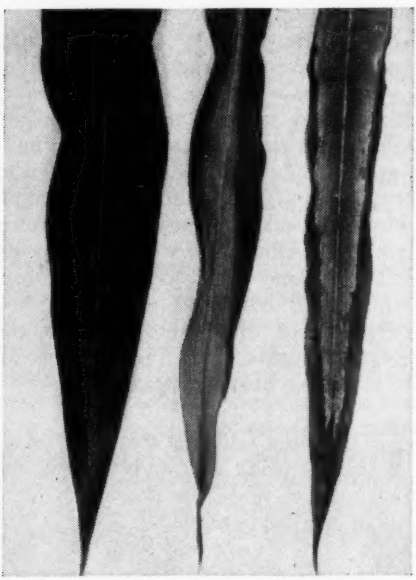
(*Turn to page* 50)

Starved Plants Show Their Hunger

By N. D. Morgan

Shreveport, Louisiana

SOMEONE has said, "If starved plants could only squeal like hungry pigs, we would pay more attention to their fertilizer needs." Even though plants cannot squeal, they have means of telling us of their plant-food deficiencies, which we speak of as "hunger signs." All crops require at least 10 or more different plant-food elements, and when the available supply of any one of these becomes exhausted, growth is seriously hindered. The symptoms of a deficiency may be regarded as the "language" plants use to tell us of their lacking in proper nourishment.



Left, complete fertilizer; center, starved for nitrogen; right, starved for potash.

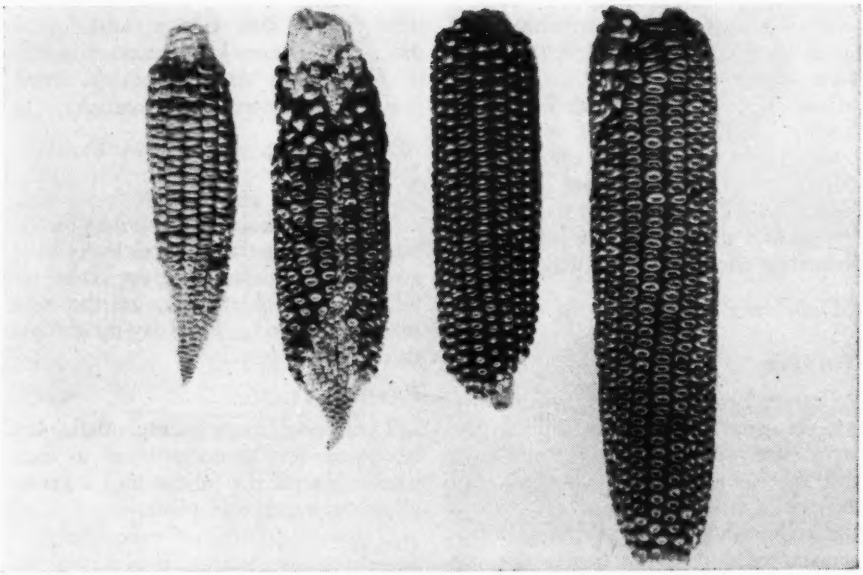
At times, it is very difficult to correctly interpret the symptoms of plant-food deficiencies in the field due to the many environmental factors constantly affecting the plants. Prolonged periods of adverse weather, insects, and diseases may cause symptoms very similar to plant-food deficiencies. But when there is a question concerning the deficiency, chemical tissue tests can be made for nitrogen, phosphate, and potash, the three elements most likely to be deficient.

Deficiency Symptoms in Corn

Nitrogen

When young corn plants are nitrogen-starved, they are stunted and spindling in appearance. The leaves become greenish-yellow to orange-yellow in color, the tip ends gradually dying. When nitrogen deficiency occurs later in the growth of corn, yellowing of the tissues occurs first in the older leaves and follows the midribs from the tip. Later, the tip begins to dry and the whole leaf may become involved, which is frequently referred to as "firing." Most people think "firing" is due directly to dry weather, but this is not true. Many times corn plants will "fire" to the ears without ever wilting. When corn plants are suffering seriously for moisture, there will be wilting from the top to the bottom and not just "firing" on the lower leaves.

It has been a general belief that high yields of corn were impossible in the south due to "dry weather." High yields of corn, over 100 bushels per acre, are



Left to right: Starved for potash; starved for phosphorus; starved for nitrogen; a normal ear which was grown with a complete fertilizer.

being obtained by a few people who are following good fertilization practices, planting good hybrids with a high population of stalks per acre, and cultivating properly. It should be thoroughly emphasized that the yellowing of corn leaves, which starts at the tip and follows the midribs is a symptom of nitrogen deficiency and not dry weather. When corn plants are suffering from dry weather, the tissues wither and dry out without the leaves necessarily becoming yellow.

Generally speaking, one and one-half pounds of nitrogen are required to produce one bushel of corn.

Phosphorus

When corn plants show no nitrogen deficiency and no potash deficiency, but have a retarded rate of growth and slow maturity, the trouble is usually phosphorus deficiency. The plants are spindling and dark green in color. The leaves and stems may become purplish in color.

Slightly over one-half pound of phosphoric acid (P_2O_5) is required to produce one bushel of corn.

Potash

The first symptom of potassium deficiency is a diminution in the rate of growth of the seedlings and young plants. The young leaves become yellowish-green to yellow in color and sometimes only streaked with yellow. The edges and tips become dry and appear scorched. This marginal scorch is the outstanding leaf symptom. Ears produced on plants deficient in potash are usually chaffy nubbins. The tip ends of the ears are unfilled. The kernels that do form are poorly matured, starchy, and easily become infected with ear-rot organisms. Bacterial wilt and Helminthosporium may cause symptoms similar to potash deficiency, but if there is any question as to the symptom, a tissue test for potash can be made.

Slightly more than one pound of potash is required to produce one bushel of corn.

Magnesium

Recently, we have heard magnesium deficiency mentioned frequently. The symptoms are definite and easily recog-

nized. A slight yellow streaking develops between the parallel veins in the older leaves with severe magnesium deficiency. There is a definite and sharply defined series of yellowish-green, light-yellow, or even white streaks extending the entire length of the leaves. These streaked tissues may dry up and die and all the leaves may ultimately show the streaking.

Deficiency Symptoms in Small Grains

Nitrogen

Oats and barley suffering from nitrogen are usually erect and spindling, the leaves are yellowish-green to yellow, and the stems are purplish-green. In the case of wheat, the plants are stunted and yellowish-green in color. In nitrogen-starved leaves, the tissues dry out from the tip toward the base.

Phosphorus

Slow growth and lack of stooling are the common signs of phosphorus starvation, particularly when the plants are dark green in color and apparently healthy otherwise.

Potash

The common symptom of potassium deficiency in small grains is the "edge-scorch." In the early stages of growth, the tips and margins of the older leaves turn yellow, then brown, and finally die. A deficiency of potassium results in weak stem development in small grain plants approaching maturity.

Deficiency Symptoms in Cotton

Nitrogen

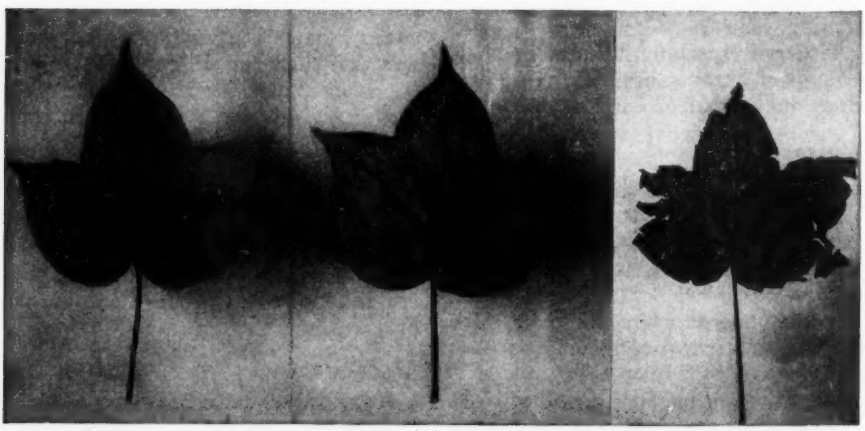
Nitrogen deficiency symptoms in cotton are characterized by relatively little growth and yellowish-green color of foliage. The older leaves are the most severely affected. They dry up and are shed prematurely.

Phosphorus

The most outstanding deficiency symptom for phosphorus is a dark green color of the foliage and a generally dwarfed type of plant.

Potash

The most common symptom of potash deficiency in cotton is what is commonly known as "cotton rust." The first symptom in the leaf is a yellowish-white mottling. The leaf color changes to light yellowish-green, and yellow spots appear between the veins. The centers of these spots die and numerous brown specks occur at the tip, around the margin, and between the veins. The tip and the margin of the leaf break down first and curl downward. As the trouble continues, the whole leaf finally becomes reddish-brown in color,



Potash-hunger signs in cotton: Left, normal leaf; center, margins affected; right, advanced stage, entire leaf affected.

dries, and is shed prematurely. As a result of this condition, the bolls are dwarfed and immature.

Magnesium

The characteristic magnesium deficiency in cotton is a purplish-red leaf with green veins. Late in the season, magnesium deficiency is sometimes confused with age or maturity, though the latter is apt to be orange-red, rather than purplish-red. Magnesium deficiency symptoms appear first on the lower leaves.

Boron

Boron deficiency symptoms first appear in the terminal growth. The terminal buds often die, which checks linear growth and may produce dwarfed, many-branched plants. At a low boron level, squares become chlorotic, the bracts flare open, and the buds drop from the plants.

Manganese

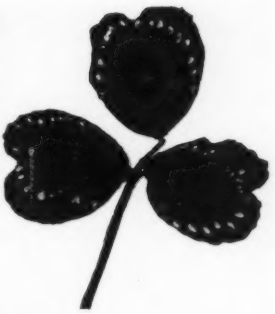
Manganese deficiency is characterized by a yellowish-grey or reddish-grey color in young leaves.

Deficiency Symptoms in Legumes

Nitrogen

A deficiency of nitrogen results in slow growth, a decrease in branching of the plant, and smaller plants at maturity. Severe deficiency often causes mild chlorosis in which the leaves become pale green with a yellowish tinge rather than distinctly yellow. The chlorosis generally spreads evenly over the entire leaf. The affected foliage usually appears first at the base of the plants, but it shows up almost simultaneously in other parts, usually toward the tips of branches or the main stem. Nitrogen-starved leaves remain chlorotic for a week or more, while the plant as a whole makes no apparent growth. The normal green color is immediately restored upon the addition of nitrogen.

It is generally assumed that the addition of nitrogen to legume plants is not advisable, but on soils very low in fertility, a small application of nitrogen to young legume plants may have very beneficial effects.



First stage of potash starvation: Regularly spaced white spots appear around the borders of the older leaves.

Second stage: These spots invade the centers of the leaves but never appear on the midribs.

Third stage of potash starvation: The leaf-borders turn yellow, dry up, and curl under.

Phosphorus

Phosphorus deficiency in legume plants is usually exhibited by slow growth with the plants remaining small and poorly developed. Flowering and seed production tend to be delayed and a bluish-green tinge may develop in the leaves, but there are no symptoms that can be used as positive symptoms for phosphorus deficiency.

Potash

Of all the symptoms observed in legumes, those of potassium hunger are

Hollow stem in cauliflower caused by boron deficiency.

probably the most outstanding and easily recognized.

Broad-leaved legumes, such as the soybean, quickly show evidence of insufficient potassium by irregular yellow mottling around the edges of the leaflets. The chlorotic areas soon merge, forming a continuous yellow border around the tip and along the sides, but rarely around the base. Death of the chlorotic area that first became mottled follows promptly, along with downward cupping of the leaf edges. Then, the dead tissue falls out, giving the leaf a ragged appearance. The marginal firing often spreads to include half or more of the area of the leaf while the center and base are still green.

The other common legumes have symptoms similar to those of the soybean, especially in the latter stages of potassium starvation. In the early stages in alfalfa, sweet clover, white Dutch clover, Persian clover, and hop clover, the yellowing is preceded by the appearance of numerous very small white or yellowish dots arranged more or less in a crescent around the tips of the leaflets. Progress from this point on resembles that in the soybean, except that there is less tendency for the symptoms to start at the base of the plant and move upward. All parts of these plants are affected almost simultaneously.

Magnesium

Magnesium deficiency in legumes varies with the species. In the soybean and the cowpea, the areas between the main veins become pale green and then yellow, while the area along the veins remains green. Magnesium deficiency has not been observed on many legumes.

Boron

Boron deficiency has been observed on a number of legume species. The symptoms are affected somewhat by external conditions. In the Central States, the most pronounced symptom is red coloration, sometimes with a purplish tint, affecting first the margins of the tip half. The abnormal color extends to take in the entire leaf surface including the veins, while the leaf tips first affected die, becoming dark brown and later light brown. The leaves affected are distributed over the entire plant, the condition being most marked in the younger portions. In alfalfa the red to purple coloration is associated with yellow, and the symptoms are more definitely centered at the top of the plant. In Western United States boron deficiency in alfalfa is known as yellow top.

Deficiency Symptoms in Truck Crops

Nitrogen

The major symptom of nitrogen deficiency in truck crop plants is very slow growth followed by a change in color. The green color of the leaves becomes lighter than normal, fading through shades of green to pale yellow. From a yellowish green, the color of the veins may change to a deep purple, which is accentuated on the under sides of the leaves. The stems may become hard

(*Turn to page* 44)

Sandblow spots (rear of picture) are often eyesores, and blowing sand may menace valuable farmland (foreground).

Weeping Lovegrass Stills Vermont's Sandblows

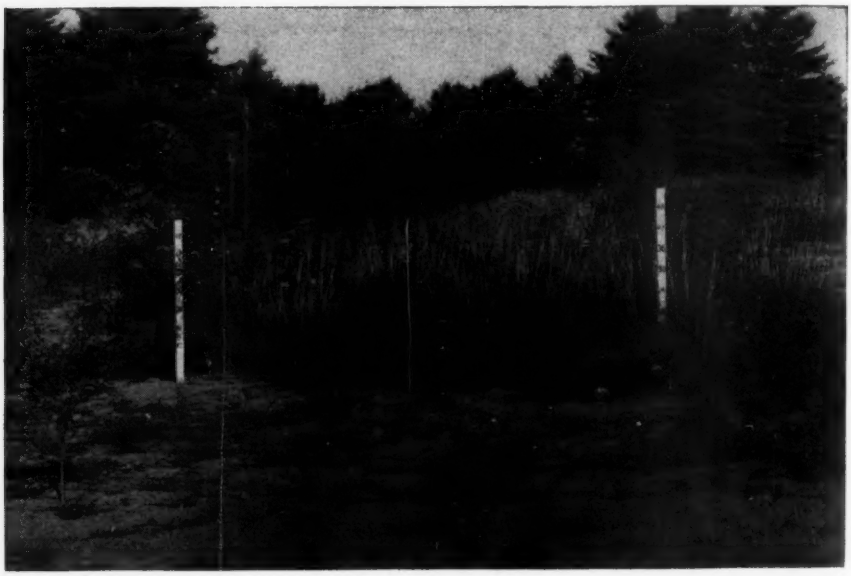
By Kathleen B. Webb

University of Vermont, Burlington, Vermont

WEEPING lovegrass plus fertilizer spell doom to Vermont's little Sahara Deserts—2,800 acres of active sandblows. This hardy grass when adequately fertilized stills the blowing sand so that locust and pines can be successfully established to provide a permanent ground cover.

Joseph B. Kelly, A. R. Midgley, and K. E. Varney, agronomists at the Vermont Agricultural Experiment Station, tested 22 different grasses and legumes before finding one that could withstand the adverse conditions in sandblows and one that did not require a great amount of expense and labor to plant.

Vermont's sandblows are extremely sterile and devoid of plant nutrients. Not only are they useless in their present condition and eyesores on any farm, but they are constantly growing and damaging other land. About 6,000 acres of Vermont farmland are subject to this type of wind erosion. On large areas in the Green Mountain State the soils are derived from water-deposited sands of glacial origin. They are naturally droughty and low in fertility. Such land should never have been cleared of trees in the first place, for without fertilization, these soils, once cleared, quickly lost their vegetative



Weeping lovegrass and black locust growing the second summer on sandblow.

cover. The organic matter was literally burned out, and then the plant-food elements, especially nitrogen and potash, were leached out. Overgrazing, excavations, field roads, cow trails, and gullies were sufficient to begin a sandblow. Once started, sandblasting constantly enlarges the area, killing plants in its path.

To meet this problem, Agronomists Kelly, Midgley, and Varney sought a practical and economical procedure for revegetation. Weeping lovegrass gave them the answer. At current prices, $12 to $15 will buy sufficient seed and fertilizer to stabilize an acre. Their proposed method of planting sandblows is presented and illustrated in Vermont Agricultural Experiment Station Bulletin 542, "Revegetation of Sandblows in Vermont."

Of the 22 grasses they tested, all but five grew poorly and after the first year disappeared completely. The five promising grasses were: weeping lovegrass *(Eragrostis curvula)*, false cheegrass *(Calomogrostis epigiose)*, sea lyme *(Elymus arenarius)*, beach grass *(Ammophila breviligulata)*, and American dunegrass *(Elymus vancouverensis)*. These grasses grew well and produced an abundance of vegetative cover, particularly when high rates of fertilizer were used. However, all of them but lovegrass had to be planted from rootstocks.

Weeping lovegrass, on the other hand, may be seeded much as any ordinary grass or legume. It is a rapid, vigorous-growing perennial bunch grass which produces a quick, stabilizing soil cover. It has an unusually extensive root system consisting of many deeply penetrating roots of about the same size throughout. This thick mat of roots helps to hold the sand in place. More than moisture, these roots require fertilizer. The deep roots can obtain sufficient moisture from the sand to support a luxuriant growth but they must have the minerals, particularly nitrogen, that are lacking on sandy soils.

The first step in the revegetation procedure recommended by the Vermont agronomists is to fence the sandblow area to prevent cattle from grazing it. Then as soon as the frost is out of the ground in the spring, the next step is

Same as opposite picture, photographed at the end of the third season of growth.

to lay the area out in alternate 12-foot grass-locust strips and 24-foot pine strips. These strips should be at right angles to the prevailing winds, with the first strip in grass-locust.

Apply fertilizer to the grass-locust strips, the agronomists say, at the rate of half a ton of ground limestone and 1,000 pounds of 5-10-10 per acre. Broadcast weeping lovegrass seed, at the rate of 3 pounds per acre, on these areas and rake the lime, fertilizer, and seed into the surface in one operation. As the grass-locust strips occupy but one-third of the total area, only four bags of limestone, three bags of a 5-10-10 fertilizer, and one pound of weeping lovegrass seed would be needed to stabilize an acre. The grass must be seeded early so that it can become established before the surface of the sandblow dries out.

The next step is to plant black locust trees (rooted nursery stock) at 6-foot intervals in two staggered rows in the grass strips. A small handful of 0-20-20 fertilizer should be put in the bottom of each hole. To promote more rapid growth the black locust may be fertilized annually at this rate for four or five years. For this annual fertilization, broadcast about the base of the trees, extending out to the ends of the outer limbs.

Early the second spring, or sometime the fall after planting the lovegrass, plant red pine (also rooted nursery stock) in the 24-foot space between the grass-locust strips, using a 6-foot spacing in four staggered rows. Fertilizer should not be used with the pine as it would do little good and would be apt to harm the young trees. Unlike black locust, pines do not respond to fertilizer. The weeping lovegrass will have stabilized the blowing sand, and by the second year much reseeding frequently occurs. Although it frequently winterkills, the lovegrass produces a dry mulch that makes an excellent ground cover, for it decomposes very slowly, both roots and top growth.

The black locust (*Robinia pseudoacacia*) is a legume tree with a strong, spreading root system that feeds heavily on subsoil minerals. Each fall it drops its leaves and leaf stems, forming a mat

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The Need for Grassland Husbandry

(With Emphasis on the Corn Belt)

By Maurice E. Heath[1]

Soil Conservation Service, Ames, Iowa

A MAJOR PROBLEM in the Corn Belt today is that of soil loss and depletion, caused by the emphasis farmers put on acres of row-crop production and concentrate feeding (grain crops and commercial supplement) of their livestock. These practices are traditional and interrelated. A sound national grassland philosophy must be developed before we can adequately practice grassland husbandry on individual farms that will result in a permanent highly productive agriculture. This will require the best thinking and efforts of all workers and leaders in the applied phases of agriculture.

What Is Grassland Husbandry?

Grassland husbandry takes into account soils-plants-animals and their interrelationships on individual farms. Sufficient acreages of adapted grass-legume combinations are provided, depending on soil needs. High quality productive forages are emphasized in livestock production, with concentrates supplementing rather than dominating the feeding practices. It is in direct contradistinction to soil exploitation.

The ultimate in grassland husbandry requires the highest type of farm management, which results in the greatest returns possible over a long period of years. It is balancing the physical factors of production at a high level and at the same time giving our people an adequate diet.

Benefits Derived

When high quality, productive grass-legume combinations are made, the foundation and hub of the farm operations, they will:

1. Reduce soil and moisture losses to a minimum.
2. Give maximum protection and make possible the optimum performance of such mechanical soil conservation practices as contouring and terracing.
3. Increase and maintain soil productivity at a high level.
4. Result in more efficient crop and livestock production through higher yields, lower labor, equipment, and power costs.

Runoff results at the various Soil Conservation Experiment Stations have shown the close-growing grass-legume crops to be several hundred times more effective than row crops in reducing soil and moisture losses. The soil loss under grass-legume combinations is negligible and usually is replaced by the natural build-up of added organic materials from these plants.

If we could reduce the vast amount of crop rotation data available throughout the Corn Belt to its simplest terms in the light of high row-crop yields and soil maintenance, recommendations for sound land-use would look something like this;

Land Classes	*Ratio of Sod Crops to Row Crops (Acres)*
I and II	1 to 1
III	2–3 to 1
Other	Grassland or Forested

[1] Associate Agronomist, Nursery Division, Soil Conservation Service, Ames, Iowa. Paper presented at the American Society of Agronomy meetings, Cincinnati, Ohio on November 18, 1947.

With these acreages of forages needed for a permanent productive agriculture, the management problem is largely twofold, (1) how to obtain the greatest yields of feed units possible from these grassland acres, and (2) how most effectively to utilize these forages as a feed with the different livestock classes. Much is being studied and much is known about forage production, but it is the latter problem that appears rather acute in the Corn Belt, particularly in the more rolling areas.

To achieve a productive balance at a high level between soils-plants-animals on individual farms, the livestock must be in the proper relationship to the soil through the crops produced. Corn and hogs, or corn and beef cattle feeding, as the sole enterprise spells soil depletion and in the end on the rolling areas leads to submarginal agriculture and ultimate land destruction.

Forages As a Feed for Livestock

It is true that even idle grass has value in soil protection and organic matter renewal, but the value of forage as a feed for livestock will largely determine its use as a crop and the extent of its culture on Corn Belt farms. Forages from the grassland acres supply both winter and summer feed for livestock. We have had great advances in the engineering phases of harvesting and storing forages as hay and silage. First, there was the pitchfork to be followed by the buckrake, hayloader, field baler, and more recently the field chopper. Developmental work seems to be in the direction of the field chopper, which results in a fluid product that can be blown or conveyed into and out of storage. It reduces hand work to a minimum.

Farmers should be encouraged always to harvest sufficient forages to meet the winter feed requirements of their livestock, plus an adequate reserve of 30 to 50 per cent of normal needs to take care of any emergency such as a severe winter, late spring, and summer drouth. To build and maintain soil fertility, hay crops should not be sold off the farm. More emphasis should be placed in filling silos with forages instead of row crops to obtain maximum soil benefits and feed value from the grassland acres.

Dry-lot Feeding Practices Wasteful

It is estimated that more than half of the fertility value of manure from dry-lot feeding operations is lost through:

1. Runoff during heavy rains.
2. Leaching.
3. Untimely handling or failure to haul and spread.

Much of this waste could be prevented by making greater use of high quality grassland during the growing season and reducing dry-lot feeding operations to a minimum. Farmers of the Corn Belt have the greatest opportunities in applying grassland husbandry by making maximum use of high quality productive forages as pasture through livestock. It is here that we have the best chance to place the farm animals in a soil improvement relationship to our land.

Making the Most of Forages with Livestock

With this in mind, what are the maximum contributions high quality forages can make as feed for different livestock classes? Farmers adopting grassland husbandry practices should know the potentialities of their animals as utilizers of good forages.

BEEF CATTLE: Forages in the form of hay, pasture, and rangeland supply nearly 80 per cent of the feed units consumed by all beef cattle in the United States. The fattening of beef cattle is one of the major enterprises in the Corn Belt. Traditionally, this has been largely dry-lot feeding. The practice of feeding 40 to 70 bushels of corn per steer in the dry lot should be seriously questioned when it comes to its soil-improving and soil-conserving relationship to the land.

In general, there are two methods of

fattening beef cattle, (1) feeding on pasture, and (2) in the dry lot. Results have shown that when high quality productive pasture is utilized, only about half as much corn is required as when fattened in the dry lot. On our productive rotation pastures in the Corn Belt, such as bromegrass-alfalfa-clover mixtures, there is a potential production of 200 to 400 lbs. of beef per acre. Such pasture when supplemented with a little corn gives excellent fattening results.

To get maximum benefits from forages in beef cattle feeding operations:

1. Eliminate as much dry-lot feeding as possible. In wintering cattle or steers preparatory to pasture feeding, emphasize utilization of high quality hay and/or grass silage to keep animals gaining not less than 0.5 to 1.0 lb. per day.

2. Provide an abundance of high quality rotation pasture such as brome-alfalfa-clover mixtures. Grass should make up from 30 to 50 per cent of the leaf part to reduce the bloat hazard to a minimum. In case of bloat trouble have dry hay available and use ground ear corn instead of shelled corn.

3. Move the feed bunks into the field in order to give the steer the fullest opportunity to make the hay and spread the manure. Limit the corn. There is nothing quite as automatic as a steer with a three-inch cutter bar for making hay, and he also is equipped with a manure spreader attachment.

4. When feeding on high quality pasture the steer will obtain his protein requirements from the forage.

5. Utilize the unimproved grassland acres and the low quality roughage with the cow herd.

HOGS: Actually, forages supply only about five per cent of the total feed units consumed by hogs in the United States. Corn and hogs have paid off a lot of mortgages in the Corn Belt and built many new homes. But corn and hogs alone also have depleted and destroyed much land.

High quality hog pastures provide, (1) a nutritious feed, and (2) are a big factor in controlling parasitic infection. Even with major emphasis on forage utilization it may still take 10 to 12 bushels of corn to produce a market hog of 200 to 225 lbs. Emphasis on forage utilization fits into the bacon type hog production program. There is a potential pork production of 300 to 750 lbs. per acre from productive high quality rotation pasture on Corn Belt farms.

With an acre of good rotation pasture carrying around 15 to 18 pigs, two acres of corn, yielding 75 to 100 bushels per acre, will be needed to finish these animals for market. What can the hog farmer do with the other forage necessary to maintain the productivity of this soil? Perhaps difficulty in getting a satisfactory answer is the reason many so-called "hog farmers" supplement their hog enterprise with dairy cattle, beef cattle, or sheep.

To get maximum benefits from forages with hogs:

1. Regulate time of farrowing to allow maximum time for utilization of high quality pastures during the growing season (one example, save gilts from fall litters to have their first pigs in the midsummer or very early fall).

2. Provide an abundance of rotation grass-legume pastures, somewhat limiting the grain, and isolate pigs from old lots and other sources of parasitic contamination. Hogs on such pastures have shown as much as 20 per cent more rapid gains, with 20 per cent less concentrate. A good rotation pasture will produce from 600 to 1,200 lbs. of protein per acre. It also will supply an adequate quantity of vitamins necessary for the health of the animal.

3. After pigs reach 75 lbs. the concentrate feeding can be reduced somewhat to increase forage utilization.

4. Old sows can satisfactorily be fattened for market on high quality pasture and corn alone.

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Four P's In Progress

By W. A. DeLong

Department of Chemistry, Macdonald College, Quebec, Canada

THIS is a progress report on soil studies carried on in the hilly region of southeastern Quebec, Canada. The field experiments have been conducted mainly within Area 1, Fig. 1.

The First P

The story begins in the late 20's when Dr. R. R. McKibbin, who recently had completed the requirements for the Ph.D. at University of Maryland, returned to Canada to work at Macdonald College. Those were revolutionary days in the field of soil science in which Dr. McKibbin had specialized. Especially was this true with respect to the systematic study and classification of soils, and it was here that his first contribution was made. For example, he recognized that many of the soils found in the southern part of the Appalachian Highland region of the province of Quebec (Fig. 1) belonged to the podsol group (2). Thus was established the first of the four P's, P for podsol.

Three More P's

The determination of the nature of the soil was of fundamental importance, since it is essential to have a knowledge of the basic characteristics of a soil before it is possible to make intelligent progress in the solution of the fertility problems of that soil; which is the story to be told here. Basic characteristics of podsols from the fertility standpoint are low pH (or high acidity), low availability of phosphorus, and often low availability of potassium as well. Here we have the other three P's—pH, phosphorus, and potash.

Progress

Having established the occurrence of podsol soils over a considerable area in

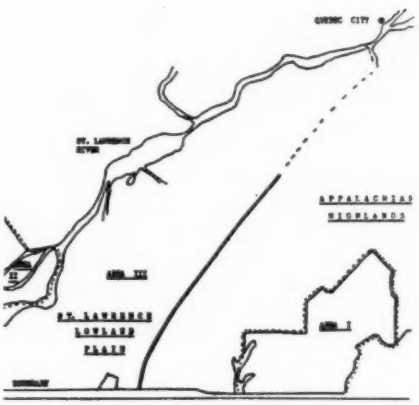

Fig. 1. Map showing the location of the Sawyerville experimental field.

in the province, Dr. McKibbin lost no time in organizing comprehensive fertility experiments on them. In these experiments the departments of chemistry, agronomy, bacteriology, and physics joined forces and cooperated with farmers working soils belonging to this group. At first, experimentation was on a very broad exploratory basis. By the year 1936, however, sufficient results had been obtained to demonstrate that the Quebec podsols behaved like podsols elsewhere and that the primary treatments required for improved crop production on them were neutralization of acidity and the application of phosphatic and potassic fertilizers. In this year the writer succeeded to the position formerly occupied by Dr. McKibbin.

In 1940 a semi-permanent experimental field was established within Area 1 (Fig. 1) near the village of Sawyerville. By this time the systematic soil survey of that region (1) had progressed far enough to reveal the extent and location of the areas occupied by the different soils and that a podsol, the

Greensboro loam, was the most extensive soil within Area 1. The new experimental field, which still is in full operation, was established on this soil.

In the main, an extensive type of grassland culture is followed in this region. Hay occupies the greatest acreage of cultivated land, followed by cereal grains, mainly oats. The proportion of the arable land in cultivated crops is small. Potatoes do well on the Greensboro soil, however, and production of this crop is on the increase. With respect to fertility treatments, it is common practice to topdress the new seeding with manure after the grain harvest. Small amounts of mixed fertilizer may be applied at seeding. Liming is not yet a general practice. It is not unusual for four crops of hay to be taken before reseeding. Under this system of management the hay yields on the Greensboro soil are stated to be of the order of one to two tons per acre and the yields of oats range from 30 to 50 bushels per acre (1).

Laboratory data accumulated in the period 1937 to 1939 (3) provide information respecting the fertility characteristics of cultivated soils of the Greensboro series under average, or better, management. Some of the results of the analysis of 84 samples taken from four experimental areas on three farms in the vicinity of Sawyerville, 28 samples from each field, are presented in Table I.

The data of Table I show that the Greensboro loam soil under the common system of management is, by the usual standards, relatively well supplied with organic matter and with nitrogen; is somewhat low in exchangeable potassium; and is definitely low in easily-soluble phosphorus.

The management scheme employed on the experimental field established in 1940 was based on a consideration of such analytical results as those shown in Table I, on the practices commonly followed by the farmer, and on the yield responses obtained from treatments applied in earlier field experiments. The scheme is described in Fig. 2 and its accompanying statements.

	O	P	K	2P	PK	(2P)K
O Ca						
1 Ca						
2 Ca						

Fig. 2. The symbols used have the following significances:

1 Ca—1.5 tons ground limestone per acre, applied broadcast to the plowed land in the autumn preceding the seeding of the oat crop.

P —400 pounds of 20 per cent superphosphate per acre.

K —150 pounds of 48 per cent muriate of potash per acre. Both the P and the K are broadcast in the spring prior to seeding of the oat (nurse) crop.

2 —Prefixing the numeral 2 indicates that the rate of application is doubled. This applies to Ca and to P only.

It is to be noted that the 18 treatments in each block (indicated in Fig. 2) are completely randomized, also that all plots receive 10 tons of farm manure, this being broadcast on the oat stubble. All these fertility treatments are given but once in the rotational cycle.

In the experimental field there are five areas, one for each crop in the two 5-year rotations followed. Each rotation is represented in each area by two blocks of plots; in each of these blocks

TABLE I.—RANGES IN FERTILITY CHARACTERISTICS OF CULTIVATED GREENSBORO SOIL.

	pH	Per cent Total N	Per cent Organic Matter	Exch. Potash lbs. K_2O/A.	Truog Phosphorus lbs. P_2O_5/A.
Minimum	4.60	.218	5.06	56	25
Maximum	5.25	.350	7.89	255	45
Mean	—	.292	6.05	108	34

Fig. 3. A group of county agents being told about the results obtained at the Sawyerville experimental field.

all the fertility treatments are represented. Rotation 1 includes the following crops: oats for grain, clover, timothy, and two crops of mixed grasses. Rotation 2 consists of oats for fodder, oats for grain, clover, timothy, and a crop of mixed grass hay.

Representative increases in yields obtained by the use of the treatments described above are given in Table II. In this table the mean yields for a 3-year period under Rotation 1 are given for the complete treatment (manure, Ca, P, and K) and for the control treatment (manure and Ca only). Hay yields are not determined in the fifth year of the rotation.

Two P's in Partnership

The yield increases shown in Table II are due almost wholly to the application of the phosphatic and the potassic fertilizers. This field had been limed to pH 6 by the farmer-owner before our experiments began, and the subsequent applications of limestone normally have not signficantly affected crop yields. The use of manure was, of course, com-

TABLE II.

Treatments	Mean Yields for a 3-Year Period			
	Oats Bu./A.	Pounds of Air-Dry Hay (15 Per cent Moisture) per Acre		
		Clover	Timothy	Mixed Hay
Complete	78.0	3,185	4,413	3,915
Control	52.9	2,647	3,673	3,319
Increases	25.1	538	740	596
Per Cent Increases	47.5	20.3	20.2	18.0

TABLE III.—YIELD OF HAY (DRY MATTER BASIS) AND ESTIMATED PERCENTAGE CONTRIBUTIONS OF DESIRABLE SPECIES TO THE GREEN WEIGHT OF HAY FROM PLOTS UNDER ROTATION 1 IN 1945; MEAN VALUES FOR DUPLICATE PLOTS.

Crop	Treatment	Yield lbs. D.M. per Plot	Per cent Legumes	Per cent Timothy
Clover, Seeded 1944.....	P	18.05	20	52
	K	11.90	71	20
	PK	20.15	60	38
Timothy, Seeded 1943.....	P	18.45	4	60
	K	15.90	37	26
	PK	23.70	18	74

mon to both the complete and the control treatments. As single treatments, both phosphorus and potassium consistently give statistically significant yield increases. The PK combination, however, is superior to either P or K alone both in respect of increases in yield of hay and in regard to the contribution of desirable species to the total yield of this crop. Data illustrative of these points are given in Table III. The yields there given were obtained by actual measurement; the contributions of legumes (includes red clover, alsike clover, and volunteer wild vetch) and of timothy to the total yield were estimated by a trained observer.

The P That's Exhausted

Rotation 2, with two successive grain crops, was included in the experimental scheme with the object of securing better seedbed preparation prior to seeding to hay. Experience has shown, however, that this rotation has given inferior results as compared with Rotation 1. In particular, it has been found that the hay yields obtained after applications of P and of K are less than for Rotation 1, and that the percentage of legumes in the hay also has tended to be lower, especially where P alone has been applied. In view of the established effect of potassium in promoting good legume stands (see Table III), it was suspected that the double cropping of grain under Rotation 2 might be depleting the supply of available potassium in the soil. Experimentation proved this to be true, as will be seen from the data presented in Table IV.

The data of Tables III and IV provide a clear indication of the importance of potassium in the management of the Greensboro soil.

The P That Pays Off

One of the ultimate questions to be answered in soil fertility studies is, Do these practices pay their way? In this connection, since the present is a period

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TABLE IV.—EFFECTS OF ROTATIONS ON THE YIELD AND THE COMPOSITION OF THE 1945 CLOVER CROP AND ON THE SUPPLY OF EXCHANGEABLE POTASSIUM IN THE SOIL.

Treatments	Rotation 1			Rotation 2		
	Yield of Hay Lbs. D.M./Plot	Per cent Legumes	Exch. K. Lbs./A.	Yield of Hay Lbs. D.M./Plot	Per cent Legumes	Exch. K Lbs./A.
P.....	18.05	20	105	11.60	3	71
PK.....	20.15	60	124	18.85	69	91

Fig. 1. Continuous timothy since 1888 with regular applications of manure is still making good hay (left), but without manure it is taken by broom sedge (right). Upper photo—before blooming; lower photo—during blooming.

Some Rates of Fertility Decline

By W. A. Albrecht

Department of Soils, University of Missouri, Columbia, Missouri

JUST how rapidly the fertility of a soil is declining may be as baffling as the question concerning the opposite effect, how rapidly a soil can be built up. To the latter we can only reply, "Very slowly." To the former, we must, unfortunately, answer "Very rapidly."

As a consequence of the rapid decline in fertility and the slow rate of its restoration, the more productive soil areas under cultivation are shrinking. Land is being taken out of production faster than we desire. Some suggested rates of fertility decline are coming to us from farmer experience and from soil-crop studies. They are putting the rate of disappearance of the soil fertility more nearly on a time basis. They are giving answers in numbers of years by which we may well look into the future. Unfortunately, however, these numbers of years before yields will be put below continuance of economic production are much smaller than we like to have them.

Pastures Decline Rapidly

Perhaps one would not expect that pastures are recording very accurately a high rate of soil fertility decline, when so much emphasis is being put upon

grass for protection against erosion. But pastures are usually the less fertile soil areas of the farm. It is for this reason that such soils are not put into tilled crops, but are commonly put to, or left in, grass. Naturally, we have no accurate measure, like bushels of grain, of the decline over the years in the fertility under grass. However, when one takes inventory of the increasing incidence of weeds—which incidence of a crop that the cow won't eat is the reciprocal of the disappearance of good grass that the cow takes readily —there are accumulating data in terms of years to tell us how rapidly the fertility is being pushed down below the level needed for cow-satisfying herbage.

The incidence of broom sedge *(Andropogon virginicus)* is one of these indicators. Its advance over the country from the East toward the West has been considered alarming by some folks. Its increasing prominence in late autumn during its ripening and scattering of seed and its fuzzy whiteness that makes its name "Old Man's Beard" very appropriate have caused extensive concern. That it is not eaten by the livestock and that it remains as a tall growth in the pasture through the winter tell us that its food value is so low that it will not even tempt animals. There is the suggestion, then, that in her refusal to eat broom sedge the cow is reporting on the rate of the decline of soil fertility. She is telling us that the soil, which once made feeds for her, is now making only bulk of no feed value according to her judgment.

The transition from a virgin soil supporting good permanent timothy to one with only broom sedge may be measured as years from the records of Sanborn Field at the University of Missouri. Two plots there have been in timothy continuously since 1888. One of these had no soil treatment except that of being plowed out and reseeded when the overseer thought it was so foul with weeds that reseeding was necessary. It has been in this grass continuously with no more attention than the annual hay harvest. The other plot alongside, also in timothy, has been given six tons of manure annually. It has been plowed each time that it was necessary to plow the weedy companion plot in order to keep the tillage treatments of these two plots alike.

The plot given manure up to this date has not yet suffered from the incidence of weeds. On the plot with no treatment, the seeding of timothy lasts now scarcely two years before weeds take over. In 1945 the broom sedge had completely taken this plot. But the broom sedge had not crossed the border lines to the adjoining timothy plot alongside given manure, nor had it gone to the roadways at the ends in continuous bluegrass.

Even this timothy, now for less than 60 years, has exhausted the fertility to the point where reseeding fails to hold much of this crop past the year of seeding. Here was cropping to a grass agriculture for but a little more than half a century to tell us that even this much-publicized system of farming for a permanent cover to guard against the erosive effects of running water needs more than merely this special system of cropping. It is suggesting that any system of cropping must be undergirded by a regular and generous flow of fertility from (a) the organic matter in decay, or (b) the exchangeable store adsorbed on the colloid, or (c) the breakdown of the mineral reserves. It is directing attention to the fertility flow that is keeping well filled those assembly lines of agriculture hidden away within the soil.

Mesquite Crowds Out Grass

The westward march of mesquite *(Prosopis glandulosa)* across the Southwest Plains to occupy what was once considered good range pastures is another trouble, equally as disturbing as the weed problem in the fenced pastures. While the mowing machine and hormone sprays may be consolation to some folks worried about the weeds in the pastures, such tools and

treatments can scarcely be feasible helps on the extensive range areas going to mesquite so completely and so speedily.

The Forest Service has cited the short time of 40 years in the Santa Rita Mountains, with their low annual rainfall, as the time required to exhaust the soil fertility by only grazing, and to push the soil's productivity down from good range for cattle to mesquite brush. Here again the figure is near the half century mark. It is small, even under the livestock system of using the land, and is the lifetime of the fertility supply at the respectable nutritive level of the short grass and its limited production of vegetative bulk.

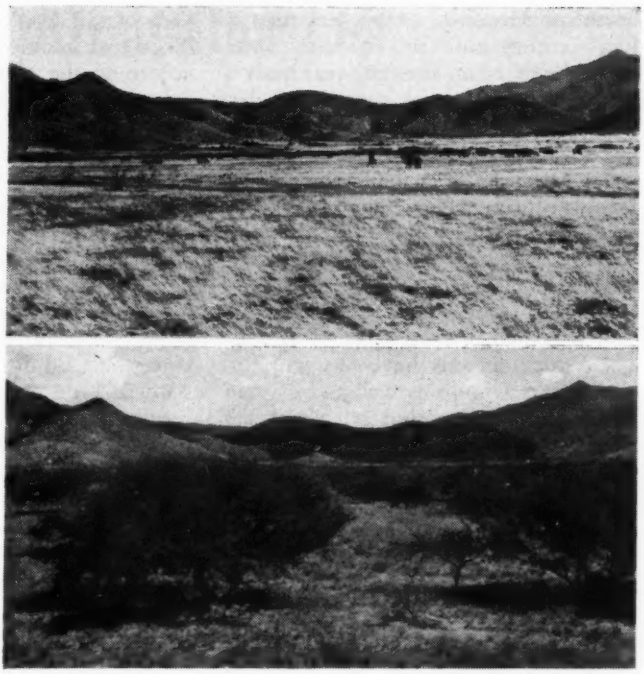

Photo Courtesy Forest Service

Fig. 2. Grasses went out and mesquite took over on these ranges in the Santa Rita Mountains in less than a half century. Upper photo—1903; lower photo—1943.

The Decline of Tilled Soil

Under tillage, the decline of the fertility of the soil would be expected to be more rapid. But even under such treatment, one cannot arrive at the longevity of the productivity by considering only the system of land use. Here too, the flow of fertility from the assembly lines of the soil determines the number of years it can hold out under the cropping pressure. Once more Sanborn Field, but this time under continuous wheat, gives some duration figures as years from its plot with no fertility return—not even the straw—since 1888.

This plot demonstrated a gradual decline of wheat yields from 1888 onward for almost 40 years before its nearly complete crop failures became so evident. These crop failures have now become almost regular occurrences in alternate years since 1925. Here are some suggestions: (a) That the virgin supply of soil organic matter is almost completely exhausted, with the former store of actively decaying humus no longer helping much to make the seed crops, (b) that the mineral reserves in their breakdown are contributing at a rate too slow for annual crops, and (c) that the clay colloid is not restocked with exchangeable nutrients by the October seeding after the crop's exhaustion of them in the preceding July harvest.

In the case of the continuous wheat, like the cases for the pastures and the ranges, the nearly half century of regular productivity was the limit given us for this prairie soil prevailing in

northeast Missouri. After less than a half century this soil became what might be called an alternate-year bearer, or a regular biennial reproducer, because of the insufficient flow of the essential inorganic nutrients from the soil. The decline in the supply of soil fertility during but a half century has recorded itself as a failure in the crop to reproduce itself as even the equivalent of the necessary seed, and then only when seed from outside sources for this plot was used.

Do such records have any implications for tree crops as well as for grain crops when we remind ourselves that it is the older apple trees that become "alternate-year," or "biennial" bearers of apple crops while young trees are annual bearers? When older cows become "shy breeders" can the decreasing soil fertility under their feed crops possibly be the indirect factors in the case?

Quite contrary to expectations and common claims for rotations in the upkeep of soil fertility, the crops in even the 6-year rotation are now down to failure on the plot given no soil treatment. This is true although corn, oats, and wheat are only three tilled crops out of six in the rotation, and each has been grown now only 10 times since the soil was put under cultivation. The clover has been failing for a quarter of a century. The timothy occupying the land for two years in the rotation has been little more than tickle grass. Rotation with no more help from the clover and sod during three years of the six was little or no different than the continuous wheat in the rate of decline of the soil fertility. Without soil treatments of manure, lime and other fertilizers, and regardless of whether continuous sod, continuous tilled cropping, or any length of rotation going as long as six years, the supply of fertility on Sanborn Field is approaching exhaustion in nearly half a century.

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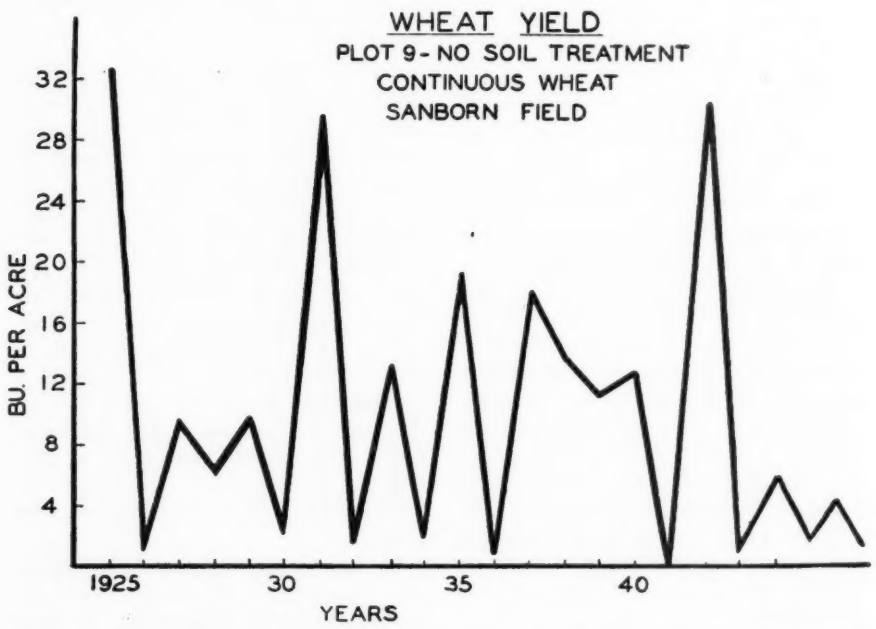

Fig. 3. The soil growing wheat continuously without treatment since 1888 on Sanborn Field, Columbia, Missouri, has become an alternate-year bearer during the last 20 years. The graph of the annual yields drops almost to zero in regular alternate years since 1925.

All at One Lick

By T. S. Buie

Soil Conservation Service, Spartanburg, South Carolina

BURLY bulldozers with blades down clank up to a gaping gully. Earth tumbles into the yawning chasm with a dust-shrouded roar. Dump trucks follow the earth-moving giants, and the gully is turned into a broad, gently sloping swale. Fertilizing and seeding machinery moves in to complete the job.

This is but one ring in the Master Conservation Field Day circus in Georgia, on the Carlyle-Blakey farm near Winder.

Plows and blades, tractor drawn, shape winding terraces as breastworks against the rains. Sericea lespedeza goes in this meadow outlet; kudzu in that. Pasture grasses and clovers are seeded in the lowlands. Border strips for wildlife blend into the landscape. Crooked trees crash with a dull thud as farm woodlands are improved.

More than 60,000 people watch in amazement as a mighty face-lifting operation is performed on this 168-acre eroded farm, so reports *The Atlanta Journal*, co-sponsor of the event with the Oconee River Soil Conservation District and the civic clubs of Winder.

A two-acre farm pond is gouged out by rumbling bulldozers which shove the earth into a dam. Waters of a spring-fed branch are turned into the pond site, and thousands of fingerling fish are spilled into their new home from tall cans on a waiting truck.

Hot dogs . . . cold drinks . . . milling crowds . . . blaring loud-speakers . . . airplanes circling overhead . . . photographers scrambling for better shots . . .

"This is a more important event in the history of man than the building of the pyramids," says Hugh H. Bennett, the Soil Conservation Service's chief. "The pyramids were built to honor the dead. We are learning here today how to live better by conserving our soil resources."

By nightfall of a cloudy day that had just enough rainfall to settle the dust, a complete soil and water conservation program had been applied on the 168-acre farm. Automobiles that had rolled in during the morning bumper to bumper over long stretches of highway, began their homeward trek.

This master conservation show was not the first, nor yet the last, of the series of dramatized demonstrations of soil and water conservation throughout the Nation. Similar events have been held in Ohio, Virginia, Maryland, Illinois, Iowa, South Carolina, Pennsylvania, Kentucky, North Carolina, Tennessee, Colorado, Arizona, and many other states, in cooperation with local soil conservation districts and under supervision of Soil Conservation Service technicians. Many others were being planned.

Soil conservationists, county agents, and other agricultural workers, newspapers, radio stations, chambers of commerce, and others are asking, "How is it done?" For an answer to that question we went to R. L. Dolvin, the Soil Conservation Service's district conservationist at Elberton, Georgia, who assisted the supervisors of the Oconee River Soil Conservation District in planning the Master Conservation Field Day at Winder and directed the technical operations.

"There just aren't any rules for putting on that kind of a field day," Dolvin said. "I studied demonstrations that had been put on in Ohio and elsewhere, but in the final analysis, we had to start

from scratch. I found that every field day presents a different set of problems.

"I can say this, though," he added. "It takes an active board of supervisors, committees to look after every phase of the show, effective leadership, a lot of cooperation by everybody concerned, and plenty of hard work."

The actual planning of the Winder field day started six months before the event came off. Former Governor James M. Cox of Ohio, publisher of *The Atlanta Journal*, saw a huge demonstration in his state and suggested to Editor Wright Bryan that *The Journal* sponsor a similar field day in Georgia, with technical assistance of the Soil Conservation Service.

When Dolvin presented the idea to the board of supervisors of the Oconee River Soil Conservation District, they were enthusiastic about the prospect. Chairman W. M. Holsenbeck appointed a committee of 14 members composed of representatives of a local bank, civic clubs, chamber of commerce, newspapers, and agricultural agencies to select a farm for the demonstration.

It was generally agreed that the farm should present a wide variety of conservation problems. It should be located on or near a main highway and should be so situated that all or most of the farm could be easily seen from a single point. The owner should be a war veteran, if possible, and should be a man who would continue the soil and water conservation program once it was established.

With these general principles to guide them, the committee members studied a large number of farms. When the selection had been narrowed down by mutual agreement to a small group of farms, a secret ballot was taken and the farm of Marion H. Carlyle and his G. I. nephew Ernest C. Blakey received a majority of the votes. It was a jointly operated dairy farm.

The Soil Conservation Service made a capability survey of the farm, which showed that seven of the eight recognized capability classes were represented. There was only a small amount of Class I and Class II land on the farm. Most of the land suitable for cultivation was in Class III, requiring intensive erosion control practices, and Class IV, suitable for perennial crops with only occasional cultivation. The land not suitable for cultivation included some low, wet areas in Class V, adapted for pasture or woodland; steep, eroded land in Class VII, suitable primarily for woodland; and a small amount of Class VIII land, suitable only for wildlife or recreation. The four SCS technicians in the district collaborated in developing with the owners a complete farm soil and water conservation plan for the use and treatment of every acre in accordance with its capabilities.

The survey showed that about one-fourth of the 92 acres of potential cropland was in gullies, scrubby trees, old bench terraces, hillside ditches, and old fence and hedge rows. Twenty-five acres were planted each year to grain and about 40 acres to cotton and corn. There were 24 acres of unimproved pasture, and 10 acres in temporary grazing crops. The rest was in woods and scattered areas of idle land. The owners were buying most of the feed for about 30 head of dairy cows on the farm.

In replanning the farm as a dairy unit, 69 acres of the best adapted land were set aside for improved permanent pasture and 23 acres for supplemental grazing, including 10 acres of browntop millet and Sudan grass, to be followed by rye grass and crimson clover in the fall, 7 acres of sericea, and 6 acres of kudzu. An additional 8 acres of sericea and 4 acres of meadow fescue and Ladino clover were planned for meadow outlets, and 1 acre of kudzu for gully control. Five acres were planned for alfalfa.

Thus in addition to the 69 acres of improved permanent pasture, and 10 acres of annual grazing crops, the new plan provided for 15 acres of sericea,

(*Turn to page* 48)

A close-up of the gully-filling operations. Dump trucks followed the bulldozers and the former gully was turned into a gently sloping swale. Then fertilizing and seeding machinery moved in to complete the job.

from scratch. I found that every field day presents a different set of problems.

"I can say this, though," he added. "It takes an active board of supervisors, committees to look after every phase of the show, effective leadership, a lot of cooperation by everybody concerned, and plenty of hard work."

The actual planning of the Winder field day started six months before the event came off. Former Governor James M. Cox of Ohio, publisher of *The Atlanta Journal*, saw a huge demonstration in his state and suggested to Editor Wright Bryan that *The Journal* sponsor a similar field day in Georgia, with technical assistance of the Soil Conservation Service.

When Dolvin presented the idea to the board of supervisors of the Oconee River Soil Conservation District, they were enthusiastic about the prospect. Chairman W. M. Holsenbeck appointed a committee of 14 members composed of representatives of a local bank, civic clubs, chamber of commerce, newspapers, and agricultural agencies to select a farm for the demonstration.

It was generally agreed that the farm should present a wide variety of conservation problems. It should be located on or near a main highway and should be so situated that all or most of the farm could be easily seen from a single point. The owner should be a war veteran, if possible, and should be a man who would continue the soil and water conservation program once it was established.

With these general principles to guide them, the committee members studied a large number of farms. When the selection had been narrowed down by mutual agreement to a small group of farms, a secret ballot was taken and the farm of Marion H. Carlyle and his G. I. nephew Ernest C. Blakey received a majority of the votes. It was a jointly operated dairy farm.

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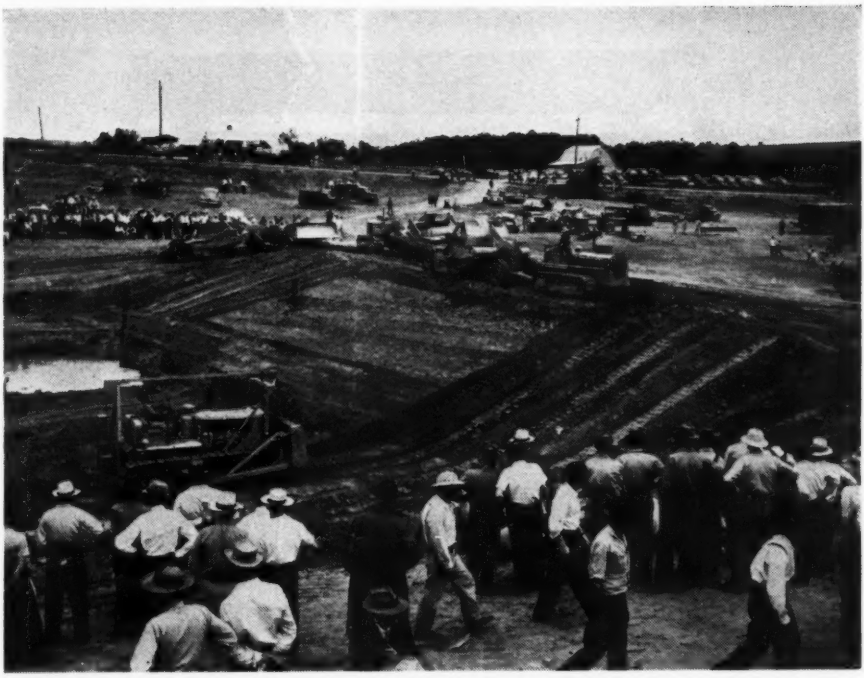
(*Turn to page* 48)

A close-up of the gully-filling operations. Dump trucks followed the bulldozers and the former gully was turned into a gently sloping swale. Then fertilizing and seeding machinery moved in to complete the job.

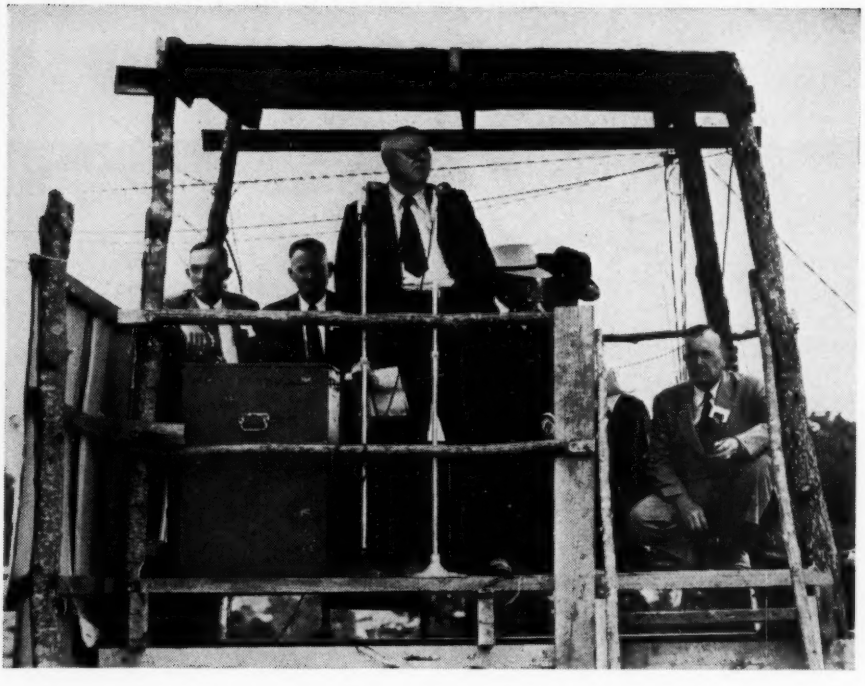
Above: **A huge gully, 50 feet deep, was filled, levelled, and seeded during the day. There was a large crowd on hand most of the time to watch the bulldozers at work.**

Below: **The milling throng was constantly on the move, going from one field demonstration to another. Some 30 to 35 different practices were being applied simultaneously on various parts of the farm.**

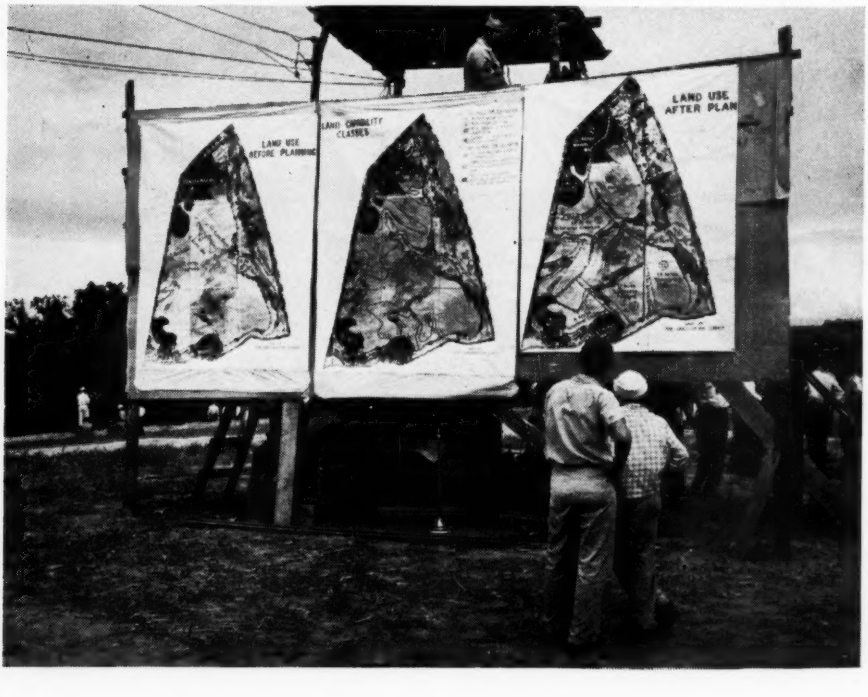


Above: **Construction of a dam for a 2-acre fish pond was one of the big earth-moving jobs in the farm "face lifting" demonstration. The pond area was fed by a small stream. By late afternoon the pond was partially filled and stocked with fish.**

Below: **Contour lines were run in sloping fields planned for crop rotations, and the land was terraced, plowed, and planted during the day.**



The speakers' platform was erected near the center of the farm. Hugh H. Bennett, the SCS Chief (at microphone above), called the demonstration "more important in the history of man than the building of the pyramids." On the side of the platform three maps were mounted (below) showing land use before planning, land capability classes, and land use after planning.



The Editors Talk

Crop Yields and Prices

The economic status of American agriculture remains good. Apprehension to the contrary is being expressed, based on the unprecedentedly large yields of agricultural commodities, excepting meats, and the feeling that as a result there should be a decline in farm prices. Such a result would be inevitable, as evidenced by earlier records, but for the price-support law enacted by Congress and still in effect. Further apprehension arises from the fact that this law is under attack. It is argued that, in combating inflation, price declines should begin with foods and that the farmer thus should be the first to take the rap.

Such apprehensions, however, are not justified by current agricultural statistics. For example, the prices of farm products averaged 290% of normal on September 15, compared to 286% a year ago. The average of prices the farmer pays, including taxes, is 250% of normal, making the parity ratio or purchasing power 116% of normal, compared to 120% a year ago. Gross farm income during the first eight months of 1948 was 4% higher than in 1947 and is expected to remain high during the remainder of the year. Thus the statistical situation at present offers little basis for pessimistic forecasts.

However, on the side of pessimism there are price declines that might be taken as trends. These arise from two causes:

(1) Due to the tremendous grain yields harvested there has been a lack of storage capacity to enable the farmer to render himself eligible for government loans, an integral part of the price-support system. Lacking storage facilities, either in government warehouses or on their own farms, some growers are throwing their grain on the market at what might be called distress prices and thus are sacrificing the 90% of parity prices obtainable under Federal guarantee were storage facilities available. It could be argued that after the distress marketing of this excess production, prices will return to the support level.

(2) Contributing also is the fact that the number of livestock maintained on farms is now at the lowest figure in 10 years. A normal livestock population would consume on the farm much of the grain now being forced on the market. Marketed as meats at current high prices, this grain would bring even higher than the support prices. Farmers who have maintained their livestock population are receiving an even higher gross income from their high yields of grain and feed.

According to the Bureau of Agricultural Economics, U. S. Department of Agriculture, prospects are that American farmers will produce even more in the future. As the wartime shortages disappear, farmers will be better able to adopt improved methods to food production that already have been developed. Even if prices decline, production probably would not be reduced much. On most farms, a reduction in output would mean larger reductions in cash returns than in cash outlays. The production methods that have raised output per acre and per worker will continue to be profitable for individual farmers.

To make full use of this increased production, the Bureau sees the necessity for changes in the production-consumption pattern. Diets of Americans generally would need to include more livestock products, fruits, and vegetables. A shift to greater livestock production would permit improvements in American diets. Livestock products have a much higher concentration of protein, minerals, and vitamins in relation to energy content than do most food crops. More efficient methods of producing and distributing food should be pushed as rapidly as possible. They will help make profitable a larger volume of production and will offset the effects of lower prices. They also will make possible a larger volume of consumption even though expenditures for food by consumers should remain unchanged.

A shift to more livestock products could help solve the problem of maintaining the natural fertility of soils. If most of the expansion is in roughage-consuming livestock, it would be possible to increase the acreage in grass and legume crops. With the largest share of farmers' expenses, 22%, now going for the purchase of feed, the value of such increase in pastures and legume crops in reducing costs to meet lower prices is obvious. The acreage of intertilled crops which cause more erosion could be reduced. Adjustments in land use to conserve land resources would help to make possible a high level of production on a sustained basis.

The economic status of American agriculture can remain good. And with it, the whole American people will benefit.

National Fertilizer Association Names New Head

On November 1, Russell Coleman will take over the presidency of the National Fertilizer Association, an organization comprised of more than 400 company members from all sections of the United States. He is succeeding the well-known Maurice H. Lockwood, who resigned to take a position as vice-president of the International Minerals & Chemical Corporation.

Dr. Coleman is a native Mississippian and took his B.S. and M.S. degrees at Mississippi State College. He then joined the State's experiment station staff in 1936, later going to the University of Wisconsin for his doctorate and a major in soil chemistry with minors in plant physiology and soil microbiology. Returning to the Mississippi Experiment Station, he served successively as graduate assistant, assistant agronomist, associate agronomist, associate director, acting director, and then, at the death of Clarence Dorman, as director (the youngest state experiment station director in the United States). He also at one time served as Professor of Soils at Mississippi State College. Under his directorship the experiment station has taken tremendous strides, both through enlargement of its facilities and correlation of its activities.

In bringing Dr. Coleman to its headquarters in Washington, D. C., the National Fertilizer Association is drawing in a wide range of knowledge of the Nation's animal and plant nutrition problems. Active participation in the American Association for the Advancement of Science, the American Society of Agronomy, the Soil Science Society of America, as well as in numerous honorary societies in scientific and professional fields, has kept him well versed in the needs for building up and maintaining the fertility of our soils.

The National Fertilizer Association is to be congratulated on its choice. Headed by a man of Dr. Coleman's training and experience, it cannot help but continue to serve well the best interests of American agriculture.

Season Average Prices Received by Farmers for Specified Commodities *

Crop Year	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
	Aug.-July	.....	July-June	July-June	Oct.-Sept.	July-June	July-June	July-June	....
Av. Aug. 1909–July 1914....	12.4	10.0	69.7	87.8	64.2	88.4	11.87	22.55	....
1923.....	28.7	19.0	92.5	120.6	82.5	92.6	13.08	41.23	....
1924.....	22.9	19.0	68.6	149.6	106.3	124.7	12.66	33.25	....
1925.....	19.6	16.8	170.5	165.1	69.9	143.7	12.77	31.59	....
1926.....	12.5	17.9	131.4	117.4	74.5	121.7	13.24	22.04	....
1927.....	20.2	20.7	101.9	109.0	85.0	119.0	10.29	34.83	....
1928.....	18.0	20.0	53.2	118.0	84.0	99.8	11.22	34.17	....
1929.....	16.8	18.3	131.6	117.1	79.9	103.6	10.90	30.92	....
1930.....	9.5	12.8	91.2	108.1	59.8	67.1	11.06	22.04	....
1931.....	5.7	8.2	46.0	72.6	32.0	39.0	8.69	8.97	....
1932.....	6.5	10.5	38.0	54.2	31.9	38.2	6.20	10.33	....
1933.....	10.2	13.0	82.4	69.4	52.2	74.4	8.09	12.88	....
1934.....	12.4	21.3	44.6	79.8	81.5	84.8	13.20	33.00	....
1935.....	11.1	18.4	59.3	70.3	65.5	83.2	7.52	30.54	....
1936.....	12.4	23.6	114.2	92.9	104.4	102.5	11.20	33.36	....
1937.....	8.4	20.4	52.9	82.0	51.8	96.2	8.74	19.51	....
1938.....	8.6	19.6	55.7	73.0	48.6	56.2	6.78	21.79	....
1939.....	9.1	15.4	69.7	74.9	56.8	69.1	7.94	21.17	....
1940.....	9.9	16.0	54.1	85.5	61.8	68.2	7.58	21.73	....
1941.....	17.0	26.4	80.7	94.0	75.1	94.4	9.67	47.65	....
1942.....	19.0	36.9	117.0	119.0	91.7	110.0	10.80	45.61	....
1943.....	19.9	40.5	131.0	204.0	112.0	136.0	14.80	52.10	....
1944.....	20.7	42.0	149.0	192.0	109.0	141.0	16.40	52.70	....
1945.....	21.2	36.6	143.0	204.0	127.0	150.0	15.10	51.10	....
1946.....	28.3	38.2	124.0	219.0	156.0	191.0	17.30	71.40	....
1947									
September...	31.21	40.7	149.0	240.0	240.0	243.0	16.10	75.60	....
October.....	30.65	41.6	150.0	205.0	223.0	266.0	16.80	90.60	....
November....	31.87	40.0	166.0	195.0	219.0	274.0	17.30	89.10	....
December....	34.06	46.9	172.0	204.0	237.0	279.0	18.10	94.80	....
1948									
January.....	33.14	45.9	186.0	217.0	246.0	281.0	18.70	95.10	....
February.....	30.71	38.5	193.0	231.0	192.0	212.0	19.60	88.60	....
March.....	31.77	29.6	196.0	237.0	211.0	221.0	19.70	87.90	....
April.....	34.10	31.2	209.0	240.0	219.0	229.0	19.40	89.40	....
May.....	35.27	40.1	196.0	244.0	216.0	222.0	18.30	90.70	....
June.....	35.22	41.7	187.0	246.0	216.0	211.0	17.90	92.20	....
July.....	32.99	43.6	166.0	262.0	202.0	203.0	18.20	96.00	....
August.....	30.41	47.4	158.0	265.0	191.0	196.0	17.80	76.60	..
Index Numbers (Aug. 1909—July 1914 = 100)									
1923.....	231	190	133	137	129	105	110	183	....
1924.....	185	190	98	170	166	141	107	147	143
1925.....	158	168	245	188	109	163	108	140	143
1926.....	101	179	189	134	116	138	112	98	139
1927.....	163	207	146	124	132	135	87	154	127
1928.....	145	200	76	134	131	113	95	152	154
1929.....	135	183	189	133	124	117	92	137	137
1930.....	77	128	131	123	93	76	93	98	129
1931.....	46	82	66	83	50	44	73	40	115
1932.....	52	105	55	62	50	43	52	46	102
1933.....	82	130	118	79	81	84	68	57	91
1934.....	100	213	64	91	127	96	111	146	95
1935.....	90	184	85	80	102	94	63	135	119
1936.....	100	236	164	106	163	116	94	148	104
1937.....	68	204	76	93	81	109	74	87	110
1938.....	69	196	80	83	76	64	57	97	88
1939.....	73	154	100	85	88	78	67	94	91
1940.....	80	160	78	97	96	77	64	96	111
1941.....	137	264	116	107	117	107	81	211	129
1942.....	153	369	168	136	143	124	91	202	163
1943.....	160	405	188	232	174	154	125	231	245
1944.....	167	420	214	219	170	160	138	234	212
1945.....	171	366	205	232	198	170	127	227	224
1946.....	228	382	178	249	212	209	146	317	204
1947									
September...	252	407	214	273	374	275	136	335	179
October.....	247	416	214	233	347	301	142	402	238
November....	257	400	238	222	341	310	146	395	272
December....	275	469	247	232	369	316	152	420	294
1948									
January.....	267	459	267	247	383	318	158	422	320
February.....	248	385	277	263	299	240	165	393	320
March.....	256	296	281	270	329	250	166	390	295
April.....	275	312	300	273	341	259	163	396	340
May.....	284	401	281	278	336	251	154	402	262
June.....	284	417	268	280	336	239	151	409	213
July.....	266	436	238	298	315	230	153	428	213
August.....	245	474	227	302	298	222	150	340	172

Wholesale Prices of Ammoniates

	Nitrate of soda per unit N bulk	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17% ammonia, Chicago, bulk per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.37	$3.52
1924	2.99	2.44	5.87	5.02	3.60	4.25
1925	3.11	2.47	5.41	5.34	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.32	5.70
1928	2.67	2.30	7.06	6.63	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.61	5.72
1930	2.47	1.81	4.78	4.96	3.79	4.58
1931	2.34	1.46	3.10	3.95	2.11	2.46
1932	1.87	1.04	2.18	2.18	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.67	3.27
1935	1.47	1.15	4.59	3.10	3.06	3.65
1936	1.53	1.23	4.17	3.42	3.58	4.25
1937	1.63	1.32	4.91	4.66	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.76	4.43
1942	1.74	1.41	6.11	5.77	5.04	6.76
1943	1.75	1.42	6.30	5.77	4.86	6.62
1944	1.75	1.42	7.68	5.77	4.86	6.71
1945	1.75	1.42	7.81	5.77	4.86	6.71
1946	1.97	1.44	11.04	7.38	6.60	9.33
1947						
September	2.66	1.73	13.65	10.41	12.75	10.72
October	2.66	1.78	15.00	10.85	12.75	13.66
November	2.66	1.78	14.22	11.06	12.75	11.53
December	2.71	1.78	15.98	11.71	12.75	12.81
1948						
January	2.78	1.83	16.22	11.71	12.75	13.28
February	2.78	1.90	15.03	12.15	12.75	12.60
March	2.78	1.90	13.68	12.06	12.75	9.47
April	2.78	1.90	13.87	11.71	12.75	8.35
May	2.78	1.90	13.77	9.54	12.75	7.89
June	2.78	1.90	14.69	9.11	8.23	8.24
July	2.78	2.07	14.56	9.22	8.80	8.73
August	2.91	2.10	10.91	9.76	8.92	8.98
	Index Numbers (1910-14 = 100)					
1924	111	86	168	142	107	121
1925	115	87	155	151	117	135
1926	113	84	126	140	129	139
1927	112	79	145	166	128	162
1928	100	81	202	188	146	170
1929	96	72	161	142	137	162
1930	92	64	137	141	12	130
1931	88	51	89	112	63	70
1932	71	36	62	62	36	39
1933	59	39	84	81	97	71
1934	59	42	127	89	79	93
1935	57	40	131	88	91	104
1936	59	43	119	97	106	131
1937	61	46	140	132	120	122
1938	63	48	105	106	93	100
1939	63	47	115	125	115	111
1940	63	48	133	124	99	96
1941	63	49	157	151	112	126
1942	65	49	175	163	150	192
1943	65	50	180	163	144	189
1944	65	50	219	163	144	191
1945	65	50	223	163	144	191
1946	74	51	315	209	196	265
1947						
September	99	61	390	295	378	305
October	99	62	429	307	378	388
November	99	62	406	313	378	328
December	101	62	457	332	378	364
1948						
January	104	64	463	332	378	377
February	104	67	429	344	378	358
March	104	67	391	342	378	269
April	104	67	396	332	378	237
May	104	67	393	270	378	224
June	104	67	420	258	244	234
July	104	73	416	261	261	248
August	109	74	312	276	265	255

Wholesale Prices of Phosphates and Potash **

	Superphosphate Baltimore, per unit	Florida land pebble 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports[1]	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports[1]	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports[1]	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657
1924	.502	2.31	6.60	.582	.860	23.72	.472
1925	.600	2.44	6.16	.584	.860	23.72	.483
1926	.598	3.20	5.57	.596	.854	23.58	.537
1927	.525	3.09	5.50	.646	.924	25.55	.586
1928	.580	3.12	5.50	.669	.957	26.46	.607
1929	.609	3.18	5.50	.672	.962	26.59	.610
1930	.542	3.18	5.50	.681	.973	26.92	.618
1931	.485	3.18	5.50	.681	.973	26.92	.618
1932	.458	3.18	5.50	.681	.963	26.90	.618
1933	.434	3.11	5.50	.662	.864	25.10	.601
1934	.487	3.14	5.67	.486	.751	22.49	.483
1935	.492	3.30	5.69	.415	.684	21.44	.444
1936	.476	1.85	5 50	.464	.708	22.94	.505
1937	.510	1.85	5.50	.508	.757	24.70	.556
1938	.492	1.85	5.50	.523	.774	15.17	.572
1939	.478	1.90	5.50	.521	.751	24.52	.570
1940	.516	1.90	5.50	.517	.730	24.75	.573
1941	.547	1.94	5.64	.522	.780	25.55	.367[1]
1942	.600	2.13	6.29	.522	.810	25.74	.205
1943	.631	2.00	5.93	.522	.786	25.35	.195
1944	.645	2.10	6.10	.522	.777	25.35	.195
1945	.650	2.20	6.23	.522	.777	25.35	.195
1946	.671	2.41	6.50	.508	.769	24.70	.190
1947							
September	.760	3.42	6.60	.353	.629	13.63	.188
October	.760	3.42	6.60	.375	.669	14.50	.200
November	.760	3.42	6.60	.375	.669	14.50	.200
December	.760	3.42	6.60	.375	.669	14.50	.200
1948							
January	.760	3.42	6.60	.375	.669	14.50	.200
February	.760	3.42	6.60	.375	.669	14.50	.200
March	.760	3.42	6.60	.375	.669	14.50	.200
April	.760	4.11	6.60	.375	.669	14.50	.200
May	.760	4.61	6.60	.375	.669	14.50	.200
June	.760	4.61	6.60	.330[1]	.634[1]	12.76[1]	.176
July	.770	4.61	6.60	.353	.676	13.63	.188
August	.770	4.61	6.60	.353	.678	13.63	.188

Index Numbers (1910-14 = 100)

1924	94	64	135	82	90	98	72
1925	110	68	126	82	90	98	74
1926	112	88	114	83	90	98	82
1927	100	86	113	90	97	106	89
1928	108	86	113	94	100	109	92
1929	114	88	113	94	101	110	93
1930	101	88	113	95	102	111	94
1931	90	88	113	95	102	111	94
1932	85	88	113	95	101	111	94
1933	81	86	113	93	91	104	91
1934	91	87	110	68	79	93	74
1935	92	91	117	58	72	89	68
1936	89	51	113	65	74	95	77
1937	95	51	113	71	79	102	85
1938	92	51	113	73	81	104	87
1939	89	53	113	73	79	101	87
1940	96	53	113	72	77	102	87
1941	102	54	110	73	82	106	87
1942	112	59	129	73	85	106	84
1943	117	55	121	73	82	105	83
1944	120	58	125	73	82	105	83
1945	121	61	128	73	82	105	83
1946	125	67	133	71	81	102	82
1947							
September	142	95	135	65	66	56	82
October	142	95	135	68	70	60	83
November	142	95	135	68	70	60	83
December	142	95	135	68	70	60	83
1948							
January	142	95	135	68	70	60	83
February	142	95	135	68	70	60	83
March	142	95	135	68	70	60	83
April	142	114	135	68	70	60	83
May	142	128	135	68	70	60	83
June	142	128	135	62	67	53	80
July	144	128	135	65	71	56	82
August	144	128	135	65	71	56	82

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer material‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash**
1924.....	143	152	143	103	97	125	94	79
1925.....	156	156	151	112	100	131	109	80
1926.....	146	155	146	119	94	135	112	86
1927.....	142	153	139	116	89	150	100	94
1928.....	151	155	141	121	87	177	108	97
1929.....	149	154	139	114	79	146	114	97
1930.....	128	146	126	105	72	131	101	99
1931.....	90	126	107	83	62	83	90	99
1932.....	68	108	95	71	46	48	85	99
1933.....	72	108	96	70	45	71	81	95
1934.....	90	122	109	72	47	90	91	72
1935	109	125	117	70	45	97	92	63
1936.....	114	124	118	73	47	107	89	69
1937.....	122	131	126	81	50	129	95	75
1938.....	97	123	115	78	52	101	92	77
1939.....	95	121	112	79	51	119	89	77
1940.....	100	122	115	80	52	114	96	77
1941.....	124	131	127	86	56	130	102	77
1942.....	159	152	144	93	57	161	112	77
1943.....	192	167	151	94	57	160	117	77
1944.....	195	176	152	96	57	174	120	76
1945.....	202	180	154	97	57	175	121	76
1946.....	233	203	177	107	62	240	125	75
1947								
September.	286	253	230	133	79	372	142	67
October...	289	254	230	136	80	387	142	71
November.	287	257	231	135	80	380	142	71
December..	301	262	236	138	81	400	142	71
1948								
January...	307	266	242	139	83	403	142	71
February..	279	263	233	139	85	393	142	71
March.....	283	262	233	137	85	379	142	71
April.....	291	264	238	137	85	380	142	71
May.....	289	265	239	137	85	370	142	71
June.....	295	266	241	128	85	309	142	65
July.....	301	266	247	131	88	317	144	68
August....	293	266	247	129	91	285	144	68

* U. S. D. A. figures. Beginning January 1946 farm prices and index numbers of specific farm products revised from a calendar year to a crop-year basis. Truck crops index adjusted to the 1924 level of the all-commodity index.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] All potash salts now quoted F.O.B. mines only: manure salts since June 1941, other carriers since June 1947.

**** The weighted average of prices actually paid for potash are lower than the annual average because since 1926 over 90% of the potash used in agriculture has been contracted for during the discount period. Since 1937, the maximum discount has been 12%. Applied to muriate of potash, a price slightly above $.471 per unit K_2O thus more nearly approximates the annual average than do prices based on arithmetical averages of monthly quotations.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"The Fertilizer Trade in Canada, July 1, 1946-June 30, 1947," Dom. Bu. of Statistics, Dept. of Trade and Commerce, Ottawa, Can.

"State Laboratory Fertilizer, Feed, Limes, and Seed Report, January-June 1948," Quarterly Bu. State Board of Agr., The Green, Dover, Del., Vol. 38, No. 2.

"Fertilizer Materials Consumed in Florida for Fiscal Year July 1, 1947, thru June 30, 1948," Fert. Stat. Div., Tallahassee, Fla.

"Act No. 93 of 1948 Regulating the Sale and Purity of Commercial Fertilizers," Dept. of Agr. and Immigration, Baton Rouge 1, La., Messrs. Sylvester, Whipp, Vallee, LaFleur, and Cleveland.

"County Fertilizer Data: Mixed Goods and Materials, July 1, 1947 through June 30, 1948," State Dept. of Agr., Jackson, Miss.

"Commercial Fertilizer Report for 1947," Dept. of Chem. Research, Agr. Exp. Sta., Mont. State College, Bozeman, Mont., Bul. 450, Feb. 1948, A. H. Kruse and P. C. Gaines.

"Soil Fertility Practices," Ext. Serv., Univ. of Nebr., Lincoln, Nebr., Ext. Cir. 175, Dec. 1947, R. A. Olson and J. W. Fitts.

"The Economy of Using Light Annual Applications of Fertilizer on Pasture," Agr. Exp. Sta., Blacksburg, Va., Bul. 414, April 1948, A. D. Pratt and C. W. Holdaway.

Soils

"Soils of Santa Clara County, California," Div. of Soils., Univ. of California., Agr. Exp. Sta., Berkeley, Calif., W. W. Weir and R. E. Storie.

"Your Stake in Improving Colorado's Watersheds," Ext. Serv., Colo. A & M College, Fort Collins, Colo., Ext. Cir. 156-A, Feb. 1948.

"Your Stake in Increasing Productivity of Colorado's Ranges," Ext. Serv., Colo. A & M College, Fort Collins, Colo., Ext. Cir. 157-A, Feb. 1948.

"Your Stake in Increasing Productivity of Colorado's Non-irrigated Land," Ext. Serv., Colo. A & M College, Fort Collins, Colo., Ext. Cir. 158-A, Feb. 1948.

"Your Stake in Increasing Productivity of Colorado's Irrigated Land," Ext. Serv., Colo. A & M College, Fort Collins, Colo., Ext. Cir. 159-A, Feb. 1948.

"Soils, Geology, and Water Control in the Everglades Region," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Bul. 442, March 1948.

"Recommended Practices for Soil Erosion Control," Agr. Exp. Sta., Mont. State College, Bozeman, Mont., Cir. 190, July 1948, A. E. Seamans.

"Soil Fertility Removed by Farm Crops," Ext. Serv., Texas A & M, College Station, Texas, M. S. 792, April 16, 1947, M. K. Thornton.

"Soil Reaction Preference of Some Plants," Ext. Serv., Texas A & M, College Station, Texas, M S. 794, April 28, 1947, M. K. Thornton.

"How Soil Reaction Affects the Supply of Plant Foods," Ext. Serv., Va. Polytechnic Institute, Blacksburg, Va., Bul. 136, Rev. March 1947.

"Soil Fertility Experiments on Spencer Silt Loam," Clark Co. Hospital Farm, Owen, Wis., Summary of Results 1944-1947, O. J. Attoe and E. Truog.

"Stubble-Mulch Farming to Hold Soil and Water," U. S. D. A., Washington 25, D. C., Farmers' Bul. No. 1997, F. L. Duley and J. C. Russel.

"Review of Principal Results—1947, Southern Piedmont Conserv. Exp. Sta.," U. S. D. A., Washington 25, D. C., May 1948.

Crops

"56th and 57th Annual Reports, January 1, 1945-December 31, 1946," Agr. Exp. Sta., Ala. Polytechnic Institute, Auburn, Ala.

"1947 Arkansas Rice Yield Tests," Agr. Exp. Sta., Univ. of Ark., Fayetteville, Ark., Rpt. Series 9, March 1948, C. R. Adair and E. M. Cralley.

"Peach Production in Arkansas," Ext. Serv., Univ. of Ark., Fayetteville, Ark., Cir. 449, Feb. 1948, E. J. Allen, Charles Lincoln, and V. H. Young.

"Reed Canary Grass," Div. of Forage Plants, Dom. Dept. of Agr., Ottawa, Can., Publ. 805, Cir. 177, May 1948, W. J. White, R. M. MacVicar, and F. S. Nowosad.

"Sweet Dent Silage," Agr. Exp. Sta., New Haven, Conn., Cir. 165, April 1948, W. R. Singleton, D. F. Jones, and H. L. Everett.

"Annual Report of the Director for the Fiscal Year Ending June 30, 1947," Agr. Exp. Sta.,

Univ. of Del., Newark, Del., Bul. 271, Jan. 1948.

"Ornamental Hedges for Florida," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Bul. 443, May 1948, Harold Mowry and R. D. Dickey.

"Levels of Carotene and Ascorbic Acid in Florida-Grown Foods," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Bul. 444, May 1948, R. B. French and O. D. Abbott.

"Pastures for Georgia," Agr. Ext. Serv., Univ. of Ga., Athens, Ga., Cir. 304, Rev. Jan. 1947, E. D. Alexander and J. B. Preston.

"Winter Grazing," Agr. Ext. Serv., Univ. of Ga., Athens, Ga., Cir. 340, Reprinted Aug. 1947, E. D. Alexander and J. B. Preston.

"Growing Raspberries," Ga. Exp. Sta., Univ. of Ga., Athens, Ga., Press Bul. 599, July 30, 1947, B. O. Fry.

"Certified Corn Hybrids for Indiana," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind., Sta. Cir. 342, July 1948, S. R. Miles.

"Recent Results of Experimental Work, First Annual Summer Agricultural Conference, August 3-5, 1948," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind.

"Indiana Crops and Livestock—Annual Crop Summary, 1947," Dept. of Agr. Stat., West Lafayette, Ind., No. 267, Dec. 1947.

"Agronomy Handbook for 4-H Clubs," Ext. Serv., Kans. State College, Manhattan, Cir. 197, 1948.

"Your Vegetable Garden Month by Month," Agr. Ext. Div., Univ. of Ky., Lexington, Ky., Cir. 376, Rev. Jan. 1948, John S. Gardner.

"Sixty-Third Annual Report of The Maine Agricultural Experiment Station, Orono, Maine, 1946-1947," Univ. of Maine.

"Varietal Trials of Farm Crops," Agr. Exp. Sta., Univ. of Minn., St. Paul 1, Minn., Misc. Rpt. 4, Jan. 1948, H. K. Hayes, E. R. Ausemus, J. O. Culbertson, and J. W. Lambert.

"Soybean Varieties and Time of Planting Experiments," Agr. Exp. Sta., Miss. State College, State College, Miss., Cir. 140, March 1948, P. R. Henson and R. B. Carr.

"Pasture Information, Year-round Grazing," Ext. Serv., State College, Miss., Misc. L. No. 2, July 1948, W. R. Thompson.

"Teamwork of Science and Agriculture—Annual Report of the Missouri Experiment Station, 1944-1945," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Bul. 510, Oct. 1947, E. A. Trowbridge and J. E. Crosby, Jr.

"Effect of Planting Time on Maturity, Yield and Quality of Soybeans in Southeast Missouri," Agr. Ext. Sta., Univ. of Mo., Columbia, Mo., Bul. 514, May 1948, C. V. Feaster.

"Lawn Culture in Missouri," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Cir. 322, Feb. 1948.

"Sweet Clover Management in a Pasture System," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Cir. 323, March 1948, C. A. Helm.

"Recommended Varieties of Farm Crops for Montana, 1948," Agr. Exp. Sta., Mont. State College, Bozeman, Mont., Cir. 189, April 1948.

"Effects of Mowing Frequency on the Yield and Protein Content of Several Grasses Grown in Pure Stands," Agr. Exp. Sta., Univ. of Nebr., Lincoln, Nebr., Res. Bul. 150, Sept. 1947, L. C. Newell and F. D. Keim.

"Producing Hybrid Seed Corn in Nebraska," Agr. Ext. Serv., Univ. of Nebr., Lincoln, Nebr., E. C. 181, April 1948, C. R. Porter and C. O. Gardner.

"Annual Report of the Board of Control for the Fiscal Year Ending June 30, 1947," Agr. Exp. Sta., Univ. of Nev., Reno, Nev.

"Agricultural Research in New Hampshire—Annual Report of the Director of the Agricultural Experiment Station for the Year Ending June 30, 1947," Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Bul. 372, Sept. 1947.

"Agricultural Research in New Mexico—Fifty-eighth Annual Report, 1946-1947," Agr. Exp. Sta., N. M. College of A&M, State College, N. M.

"Improved Strains of Cotton for New Mexico," Agr. Exp. Sta., N. M. College of A&M, State College, N. M., Bul. 337, March 1948, G. N. Stroman.

"Trees and Shrubs for Eastern North Dakota Windbreaks," Ext. Serv., N. D. Agr. College, Fargo, N. D., Cir. A-122, Oct. 1947.

"Trees and Shrubs for Western North Dakota Windbreaks," Ext. Serv., N. D. Agr. College, Fargo, N. D., Cir. A-123, Oct. 1947.

"Vetch for Soil Improvement," Ext. Serv., Okla. A&M College, Stillwater, Okla., Cir. 472, Wesley Chaffin.

"Making and Feeding Grass and Legume Silage in Western Oregon," Fed. Coop. Ext. Serv., Oregon State College, Corvallis, Oreg., Ext. Bul. 669, June 1946 (Rev. Jan. 1948), M. G. Huber, R. W. Morse, and E. R. Jackman.

"The Chehalem Blackberry," Agr. Exp. Sta., Oregon State College, Corvallis, Oreg., Sta. Cir. of Info. No. 421, March 1948, G. F. Waldo.

"Growing Garden Peppers," Fed. Coop. Ext. Serv., Oregon State College, Corvallis, Oregon., Ext. Cir. 500, Feb. 1948, A. G. B. Bouquet.

"Control of Weeds in Special Purpose Turf with 2, 4-D," Agr. Exp. Sta., Pa. State College, State College, Pa., P. R. No. 1, July 1948, H. B. Musser.

"Pastures for South Carolina," Ext. Serv., Clemson Agr. College, Clemson, S. C., Bul. 99, Rev. June 1948.

"Agricultural Research in South Dakota, Sixtieth Annual Station Report, July 1, 1946 to June 30, 1947," Agr. Exp. Sta., S. D. State College, Brookings, S. D.

"Gardening . . .," Ext. Serv., S. D. State College, Brookings, S. D., Ext. Cir. 431, March 1948, Leonard Yager.

"Forests in the Making," Texas Forest Serv., Texas A&M, College Station, Texas, Cir. 20.

"The Seventh Year . . . of Record Production," Ext. Serv., Texas A&M, College Station, Texas, A. R. 1947.

"Growing Strawberries," Ext. Serv., Texas A&M, College Station, Texas, L-60, 1947, J. F. Rosborough.

"The Poinsettia," Ext. Serv., Texas A&M, College Station, Texas, MS-777, Jan. 1947, Sadie Hatfield.

"Pasture Improvement Practices for 4-H Club Members," Ext. Serv., Texas A&M, College Station, Texas, MS-807, Feb. 1948, R. R. Lancaster.

"How to Plant and Take Care of Your Lawn," Ext. Serv., Utah State Agr. College, Logan, Utah, Ext. Bul. 164, April 1948, A. E. Smith.

"How to Grow Sweet Corn in Utah," Ext. Serv., Utah State Agr. College, Logan, Utah, M. S. No. 703, June 1948, E. M. Andersen.

"Vegetable Gardening in Vermont," Agr. Ext. Serv., Univ. of Vt., Burlington, Vt., Cir. 109, Rev. March 1948, C. H. Blasberg.

"A Handbook of Agronomy," Agr. Ext. Serv., Va. Polytechnic Institute, Blacksburg, Va., Bul. 97, Rev. July 1947.

"How to Grow Alfalfa on the Spencer Silt Loam Area," Soils Dept., Univ. of Wis., Madison, Wis., July 15, 1948, E. Truog and O. J. Attoe.

"27th Annual Report Wood County Extension Service, 1947," Wood County, Wis., Donald R. Rowe.

"Wheat Varieties for Wyoming," Agr. Exp. Sta., Univ. of Wyo., Laramie, Wyo., Bul. 282, March 1948, D. L. Klingman.

"Grass, Yearbook of Agriculture, 1948," U.S.D.A., Washington 25, D. C.

"Distinguishing the Species of Brassica by Their Seed," U.S.D.A., Washington 25, D. C., Misc. Publ. No. 643, April 1948, A. F. Musil.

"Yellows-resistant Varieties of Cabbage in the Early and Midseason Roundhead Groups," U.S.D.A., Washington 25, D. C., Cir. 775, April 1948, J. C. Walker and J. P. Jolivette.

"Yellows-resistant Cabbage Varieties in the Danish Ballhead-Hollander Group," U.S.D.A., Washington 25, D. C., Cir. 776, April 1948, J. C. Walker, R. E. Foster, and J. E. Kuntz.

"Red Pine Management in Minnesota," Lake States Forest Exp. Sta., Forest Serv., U.S.D.A., Washington 25, D. C., Cir. 778, May 1948, F. H. Eyre and Paul Zehngraff.

"Effect of Crop Rotation and Manure on the Yield and Quality of Sugar Beets, United States Scotts Bluff (Nebr.) Field Station, 1930-41," U.S.D.A., Washington 25, D. C., Cir. 779, July 1948, S. B. Nuckols and Lionel Harris.

"Improvement of Pastures for Dairy Cattle in Middle Tennessee," U.S.D.A., Washington 25, D. C., Cir. 786, March 1948, A. G. Van Horn and J. R. Dawson.

"Strawberry Culture, South Atlantic and Gulf Coast Regions," U.S.D.A., Washington 25, D. C. Farmers' Bul. No. 1026, Rev. Feb. 1948, G. M. Darrow.

"Growing Erect and Trailing Blackberries," U.S.D.A., Washington 25, D. C., Farmers' Bul. 1995, April 1948, G. M. Darrow and G. F. Waldo.

"Save Grain Through Good Pasture!" U.S.D.A., Washington 25, D. C.

"Vegetative Characteristics of Some Wild Forms of Saccharum and Related Grasses," U.S.D.A., Washington, D. C., Tech. Bul. 951, March 1948, E. Artschwager.

"Save Grain with Better Hay Crops!" U.S.D.A., Washington, D. C., OFFC-16, June 1948.

Economics

"Agricultural Cooperatives—Legal Phases, Principles, Objectives, Types," Ext. Serv., Univ. of Ark., Fayetteville, Ark., Cir. 447, July 1947, Clifford Alston.

"Statistical Supplement to Agricultural Experiment Station Circular 385, California Clingstone Peaches, Economic Status, 1948," Agr. Exp. Sta., Univ. of Calif., Berkeley, Calif., May 1948, Sidney Hoos and H. F. Phelps.

"1947 Alfalfa Cost and Management Study, Antelope Valley," Agr. Ext. Serv., Univ. of Calif., Office of the Farm Adviser, 808 North Spring St., Los Angeles 12, Calif.

"1947 Sugar Beet Production Cost and Management Study, Antelope Valley," Agr. Ext. Serv., Univ. of Calif., Office of the Farm Adviser, 808 North Spring St., Los Angeles 12, Calif.

"Economic Possibilities of Macadamia Nuts as a Hawaiian Crop," Agr. Econ. Sect., Agr. Ext. Serv., Univ. of Hawaii, Honolulu 10, T. H., Ext. Cir. 248, June 1948, Ralph Elliott.

"Part-time Farming in New England," Ext. Serv., Univ. of Mass., Amherst, Mass., Leaflet 238, Oct. 1947.

"Farm Land Prices in the Midwest," Agr. Exp. Sta., Mich. State College, East Lansing, Mich., Spec. Bul. 349, June 1948.

"Montana Farmer Cooperatives 1941 and 1946," Agr. Exp. Sta., Mont. State College. Bozeman, Mont., Bul. 449, Jan. 1948, H. F. Hollands.

"Cost of Producing Sweet Corn in the Willamette Valley, Oregon—a Preliminary Summary," Agr. Exp. Sta., Oreg. State College, Corvallis, Oreg., Sta. Cir. of Info. No. 422, March 1948, G. B. Davis and D. C. Mumford.

"Cost of Producing Table Beets in the Willamette Valley, Oregon—a Preliminary Summary," Agr. Exp. Sta., Oreg. State College, Corvallis, Oreg., Sta. Cir. of Info. No. 423, March 1948, G. B. Davis and D. C. Mumford.

"Cost of Producing Carrots in the Willamette Valley, Oregon—a Preliminary Summary," Agr. Exp. Sta., Oreg. State College, Corvallis, Oreg., Sta. Cir. of Info. No. 424, March 1948, G. B. Davis and D. C. Mumford.

"Farm Outlook Information South Carolina —1948," Ext. Serv., Clemson Agr. College,

Clemson, S. C., Spec. Outlook Info. Leaflet, Jan. 1948, M. C. Rochester.

"1947 Fifth Annual Report—Southeastern South Dakota Farm Record Summary," Agr. Exp. Sta., S. D. State College, Brookings, S. D., Agr. Econ. Pamph. No. 25, July 1948, R. O. Olson.

"Selected Summary of the Year's Business in the Texas Farm Unit Program," Texas A&M, College Station, Texas, M.S. 785.

"Cost and Efficiency of Canning Pea Production in Cache and Box Elder Counties, Utah, 1946-1947," Agr. Exp. Sta., Utah State Agr. College, Logan, Utah, Bul. 331, June 1948, E. M. Morrison.

"Report on Agricultural Production for Utah for 1948," Agr. Exp. Sta., State Agr. College, Logan, Utah, Mimeo. Series 339, Oct. 1947.

"What Will Become of Your Farm?" Ext. Serv., Va. Polytechnic Institute, Blacksburg, Va., Bul. 169, June 1947, A. J. Walrath and W. L. Gibson, Jr.

"Feed Is Food—Use It Wisely," Ext. Serv., Univ. of Wis., Madison, Wis., Spec. Cir., Jan. 1948.

"Small Farms in Wisconsin," Agr. Exp. Sta., Univ. of Wis., Madison, Wis., Bul. 473, Jan. 1948, Walter W. Wilcox and John Kutish.

"Director of Organization and Field Activities of the Department of Agriculture: 1947," U. S. D. A., Washington, D. C., Misc. Publ. No. 640, Issued Jan. 1, 1948.

"Farmers' Produce Markets in the United States, Part I, History and Description," U. S. D. A., Washington, D. C., Jan. 1948.

"The Balance Sheet of Agriculture, 1947," Bu. of Agr. Econ., U. S. D. A., Washington, D. C., Misc. Publ. 642, Feb. 1948, A. S. Tostlebe, R. J. Burroughs, H. C. Larsen, L. A. Jones, H. T. Lingard, L. R. Hudson, and S. L. Yarnall.

"Origin, Structure, and Functions of the U. S. Department of Agriculture," Office of Inf., U. S. D. A., Washington, D. C., Document No. 1, Rev. March 1, 1948.

"Progress of the Production Credit System Through 1947," Farm Credit Admin., U. S. D. A., Washington 25, D. C., Dec. 31, 1947.

"Cotton Quality Statistics, United States, 1946-47," Prod. and Marketing Admin., U. S. D. A., Washington, D. C., CS-26, Jan. 1948.

"Peanuts; Acreage, Yield per Acre, Production, Farm Disposition, and Value, 1909-45," Bu. of Agr. Econ., U. S. D. A., Washington, D. C., March 1948.

"Horticultural Organizations of the United States and Canada," Library, U. S. D. A., Washington 25, D. C., Library List No. 16, Rev., Jan. 1948, Compiled by Nell W. Smallwood.

"Commercial Horticultural Organizations of the United States and Canada," Library, U. S. D. A., Washington 25, D. C., Library List No. 17, Rev., Jan. 1948, Compiled by Nell W. Smallwood.

"Winter Cover Crop Seeds," Bu. of Agr. Econ., U.S.D.A., Washington, D. C., April 1948.

"Sweetpotatoes—Production, Farm Disposition, and Value, by States, 1909-45," Bu. of Agr. Econ., U.S.D.A., Washington, D. C., March 1948.

Yield and Quality

A MIXED fertilizer containing phosphorus and potassium when used in addition to limestone and legumes gave an increase of 13 bushels per acre in corn yield, reports H. J. Snider, assistant chief, soil experiment fields, University of Illinois College of Agriculture.

This fertilized corn contained 10.6 per cent protein in the grain compared to 9.1 per cent in the grain from the unfertilized plot. The fertilized corn also contained 50 per cent more mineral phosphorus in the grain.

These results were obtained on an experiment field located near Sparta, Randolph county, Illinois. Limestone was added in amounts sufficient to grow legumes on the light-colored sour soils. Legumes such as lespedeza and sweet clover along with other crop residues were plowed back into the soil.

Mixed fertilizer known as 0-20-20 was applied regularly around the rotation, 100 pounds for corn, 100 pounds for wheat, and 200 pounds an acre for the hay crop. This soil treatment practice proved to be very effective on this southern Illinois land, Snider stated. He pointed out that an increased content of protein and a higher percentage of phosphorus in corn grain add to its feeding quality and tend to insure better feeding results with livestock.

A NATIONAL Soil and Fertilizer Research Committee consisting of scientists from the Land Grant Colleges and the U. S. Department of Agriculture has been organized to assist in planning national and regional studies of soils, fertilizer, and irrigation.

Dr. H. C. Knoblauch of the Office of Experiment Stations was elected chairman of the 10-man committee. Other members are: Dr. F. E. Bear, New Jersey Experiment Station, New Brunswick; Dr. W. R. Paden, South Carolina Experiment Station, Clemson; Dr. R. W. Cummings, North Carolina Experiment Station, Raleigh; Dr. C. O. Rost, University of Minnesota, St. Paul; Dr. D. W. Thorne, Utah Experiment Station, Logan; Dr. W. T. McGeorge, Arizona Experiment Station, Tucson; Dr. Mark L. Nichols, Soil Conservation Service; and Dr. Frank W. Parker and Dr. K. D. Jacob, Bureau of Plant Industry, Soils and Agricultural Engineering.

The committee was formally organized following a 3-day conference held early in March at the Plant Industry Station, Beltsville, Md., and will promote the coordination of State and Federal investigations in this field.

Weeping Lovegrass Stills . . Sandblows

(*From page* 13)

on the soil surface. Kelly, Midgley, and Varney analyzed the leaf mold deposited beneath a 9-year-old stand of black locust and found it amounted to 4½ tons per acre.

The nitrogen returned to the soil by 4.5 tons of black locust leaf mold is equal to 1,000 pounds of nitrate of soda per acre. The potash content is equivalent to 13 pounds of 50 per cent muriate of potash, phosphorus equivalent to 100 pounds of superphosphate, and lime equivalent to 280 pounds of ground limestone. Thus the black locust plays a big part in rebuilding the fertility of the soil at the same time that it makes a short-time tree crop.

The red pine (*Pinus resinosa*) is less susceptible to insect and disease damage than other pines and is also a valuable

species for lumber purposes. It affords a long-time cover that has a future value as marketable timber.

Thus with this method of using weeping lovegrass, fertilizer, black locust, and red pine, revegetation of Vermont's sandblows becomes a practical undertaking. Vermont's farmers can reclaim lost land and halt the destruction caused by the stinging particles of blowing sand in 2,800 acres of Sahara Deserts.

Some Rates of Fertility Decline

(*From page* 24)

Task of Future Restoration

Reproduction by the plant from seed is not a matter of only the starch in it, except as this is reserve energy for the germ that is rich in protein and many other compounds. For the synthesis of these complex components representing potential reproduction, the fertility of the soil, more than the weather, is demanded. Troubles in reproduction in plants and animals are the reflection of the declining fertility supply in the soil. Shrinking lifetimes of our fields are the underlying causes of much that has not yet been traced to this as the cause. Better reproduction can come only as we minister to the soil, which is the source of the entire process of creation. If creation of food as plants and animals is to continue abundantly in the future, we can scarcely guarantee its projection there without being guided by the records of the past concerning the rates of decline of the soil fertility.

Four P's in Progress

(*From page* 20)

of scarcity and of high price of protein feeds, it is pertinent to consider the yield increases obtained in these experiments in terms of increased protein production. From data available it is possible to express the results obtained for the grain and clover crops harvested in 1946 in this way. In the calculation of the crude protein values the conventional factor of 6.25 was used. The values obtained are given in Table V.

From Table V it is seen that the total increased production of protein in the first two years of Rotation 1 in the 1946 crop-year amounted to no less than 343 pounds per acre. This is the equivalent of the protein content of considerably more than a ton of wheat bran. Currently the latter is selling in Canada at about 58 dollars per ton. The total cost of the superphosphate and muriate of potash supplied in the PK treatment, plus that of 1.5 tons of ground limestone, is approximately 12 to 15 dollars.

TABLE V.—EFFECT OF MINERAL FERTILIZERS ON THE PER ACRE PRODUCTION OF CRUDE PROTEIN BY THE OATS AND THE CLOVER CROPS UNDER ROTATION 1 IN 1946.

Crop	Fertilizer Treatment	Crop Yields (lbs.)	Crude Protein Yields (lbs.)	Increase in Protein Yield (lbs.)
Oats, grain	PK	2,663	373	
	Control	1,460	205	168
Clover hay	PK	3,817	338	
(15 per cent Moisture)	Control	2,168	163	175

Fig. 4. The control plot.

Even though the yield increases for the oats and the clover crops in 1946 (for which year analytical data happened to be available) were somewhat larger than the long-term average, it would appear reasonable to conclude that the treatments applied are profitable under present price conditions. Further, as indicated in Table II, yield responses continue into the third and the fourth years of the rotation. No account of these effects was taken in the preceding calculations since data on the nitrogen contents of the hay crops produced in the later years of the rotation were not available.

Fig. 5. The phosphate-only plot.

Fig. 6. The lime, phosphate, and potash plot.

Summary

Progress in these soil investigations has followed the recognition of the importance of the kind of soil (podsol) and of its natural characteristics, and the discovery of the favorable effects on crop production resulting from regulation of the pH and of the supplies of phosphorus and of potassium in available form. Under present conditions, one of the most important results has been the increased protein production obtained.

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2. McKibbin, R. R., and Pugsley, L. I. 1930. Soils of the Eastern Townships of Quebec. Macdonald College Tech. Bul. 6.
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Starved Plants Show Their Hunger

(*From page* 10)

and fibrous and they, too, may become deep purple in color with severe nitrogen deficiency.

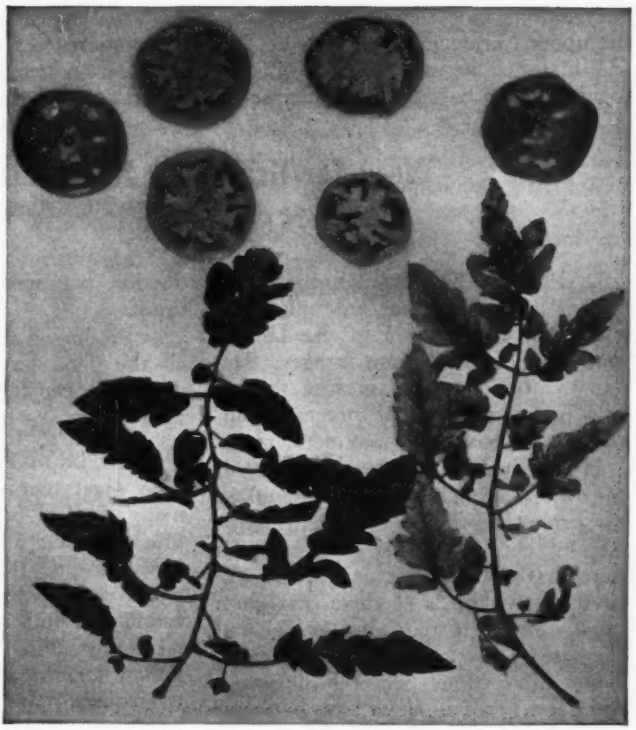
Phosphorus

The symptoms of phosphorus deficiency in vegetable crops are slow growth and delayed maturity. An early symptom in tomatoes is the development of a reddish-purple color on the under side of the leaf. The color in the web of the leaf may first appear in spots and later spread over the entire leaf, with the veins finally becoming reddish-purple. The foliage eventually assumes a purplish tinge. The stems are slender and fibrous. The leaves are small and the plant is late in setting fruit.

Potash

A deficiency of potassium is recognizable by a change in color of the vegetative parts as a whole and the occurrence of spots caused by the breaking down of the tissues. In soils extremely low in potash, the symptoms

may appear in the seedling stage, but in those with supplies that are moderate yet not sufficient to support normal growth to maturity, they may not appear until the fruiting stage. In soils with medium content of potash and an abundant supply of nitrogen, potassium deficiency symptoms may develop after a period of rapid growth. Where there is a moderate supply in the soil, potassium starvation may appear first at the middle of the plant and work upward; but in very deficient soils, the symptoms usually appear first in the older leaves at the base of the plants.



Healthy tomato leaf and fruit (left); potash-starved leaf and fruit (right). Note the hollow, irregularly ripened fruit from the potash-starved plant. The leaves are yellowed, with greenish-tinted veins.

Potassium-starved tomato plants grow slowly, are stunted, and have a low yield. The young leaves become finely crinkled. Older leaves have an ashen grayish-green color at first, developing a yellowish-green along the margins. The injury progresses from the margin toward the center of the leaflet, causing a bronzing of the tissue, which is followed by the development of large, light-colored spots between the larger veins. The affected areas often turn a bright orange color and frequently become brittle. The leaves turn brown and finally die. The stems become hard and woody and fail to increase greatly in diameter, remaining slender.

Bronzing along the margins of the leaves of most vegetable crops is a common potash deficiency symptom.

Boron

Boron deficiency on tomatoes is indicated by a yellowing of the tip of the leaflet, accompanied by a pinkness of the veins. The leaves later become orange and then die. On celery, a longitudinal and transverse cracking of the stem occurs. An internal breakdown or rotting of the stem on cabbage and cauliflower usually develops when boron is deficient. On cauliflower, the curd becomes brown or watersoaked in appearance.

Magnesium and Manganese

On tomatoes and most broad-leaved plants, magnesium deficiency is characterized by a yellowing of the tissue between the veins. The areas along the veins remain green, making them stand out in outline. The deficiency tends to show up first on the lower, older leaves. Manganese deficiency often shows a pattern similar to magnesium defici-

ency, but is more likely to appear on the upper, younger leaves.

While it sometimes is a little difficult to identify with certainty the cause of abnormal appearances of plants, careful observation often will give very helpful information or at least leads on whether a nutrient deficiency may be the cause.

Need for Grassland Husbandry

(*From page* 16)

DAIRY CATTLE: Approximately 75 per cent of all the feed units consumed by dairy cattle in the United States are obtained from forages. The dairy cattle enterprise is very flexible in adjusting the ratio of forages to concentrates as soil needs may demand.

High quality pasture herbage is shown to contain all the factors required for perfect nutrition of the dairy cow. Results obtained in several Midwest states have shown that dairy cows will produce two-thirds of their maximum on a nutritive forage diet at one-half the cost of a ration necessary for maximum production. Several all-forage-fed dairy herds in Iowa have averaged between 300 and 400 lbs. of butter fat annually, with one herd above the 400-lb. mark.

It has been estimated that 80 per cent of the dairy cows are decidedly underfed at some time during the growing season because of scant or inadequate pasture. This is a problem of primary importance. Productive high quality grassland acres in the Corn Belt have a potential production of 4,000 to 7,000 lbs. of four per cent milk per acre.

To get maximum benefits from forages with dairy cattle:

1. Provide the yearly equivalent of six tons of high quality legume-grass hay per cow in the form of pasture, silage, and hay.

2. Improve permanent pastures or develop sufficient rotation pastures to provide an abundance of herbage throughout the growing season.

3. Results from Maine to Wisconsin indicate that, in general, use of improved pastures will increase milk production per acre from three to four times.

4. Producing cows should be allowed all the good hay and/or grass silage they will eat throughout the pasture season.

POULTRY: Poultry, like hogs, have been great users of concentrates. On many farms, poultry have obtained much of their feed nutrients from materials around the farm that otherwise would have been wasted. It has been found that poultry raised on high quality forage range can obtain much of their protein needs for forage, reducing the concentrate intake from 15 to 20 per cent.

To get maximum benefits from forages with poultry:

1. Set aside the equivalent of one acre of adapted grass-legume combinations for each 250 to 300 birds produced.

2. Cut back the herbage to six inches when necessary through spring and summer, to increase the supply of tender succulent green feed.

3. Supplement the herbage with a grain mash (protein content at 12 per cent) to encourage ranging and forage consumption.

4. Alfalfa leaf meal can constitute up to 15 per cent of the laying mash.

SHEEP: With over 95 per cent of the feed units consumed by sheep and goats in the United States coming from forages, the problem is not one of increasing the feed unit consumption of forages, but of providing higher quality herbage, with production more evenly distributed throughout the growing

season. Many farmers have the idea that low quality forage or poor pastures can be efficiently utilized by sheep. It has been shown, however, that sheep respond to high quality forages the same as any other class of livestock. The ewe flock, after lamb weaning, can utilize rather low quality forage advantageously.

To get maximum benefits from forages with sheep:

1. Provide an abundance of high quality productive pasture on which to fatten lambs. These pastures may consist of brome-alfalfa-clover mixtures, lespedeza-grass combinations, or improved bluegrass pasture with a predominance of legumes.

2. Supply the breeding flock with high quality legume-grass forage in the form of hay and silage during the winter months. Productive pastures of high quality should be used in the spring while the ewe suckles the lamb. After weaning the lamb, the ewe flock can utilize unimproved pastures.

Economy of Pasturing Forages

The economy of pasture is due in a large part to the fact that labor is saved, the animals gathering their own feed and spreading the manure as they graze. The important consideration in the utilization of high quality pasture with marketable classes of livestock is that we obtain as many feed units per acre as possible, through proper soil treatments, adapted grass-legume combinations, and grazing practices. The following crops are listed in order of economy of production, per 100 lbs. of digestible nutrients of different feeds:

Crop	*Economy of Production*
Forages as pasture	1
Forages as hay	2
Corn for grain	3
Oats	4

Producing a High Quality Sod

A high quality sod is one that results from the growth of a grass-legume combination, the forage of which has been so utilized through livestock that maximum row-crop acre yields are obtained when such crops follow in rotations. The sod effect is from the fibrous grass roots. Therefore, the root quality should be a character considered when determining the species or strain of grass. Experimental results indicate that maximum nitrogen is stored by the end of the second hay or pasture year so far as alfalfa is concerned. A well-developed grass root system is usually observed in the plow layer by the end of the second year meadow. With sufficient grass roots to sponge up this nitrogen it can be held and made available when the corn crop following needs it most.

The quality of the sod is improved by utilizing the grass-legume growth through livestock as pasture. Under such management only a minimum of plant nutrients is removed from the field.

In effect, a three- to four-ton hay yield equivalent pastured with livestock will approach 15 tons of manure per acre annually. When utilized through two years as pasture, the organic matter accumulation is high. To obtain maximum corn yields the sod crop must be plowed down while the forage is still highly productive.

Grass roots provide a much more stable type of organic matter than do the legumes. The decomposition of grass roots is somewhat proportional to the summer temperatures. Corn requires nearly 90 per cent of its total nitrogen supply in July and August. It is at this time that the grass root decomposition is most rapid, thus releasing the greatest quantity of nitrogen for use by the corn plants.

A high quality sod means a minimum of tillage operations on the row crop that follows. The cycle of most annual weeds has been completely upset by the development of the perennial sod crop.

A high quality sod provides the foundation for, and is largely responsible for, the success of such soil conservation practices as contouring and terracing.

Suggestions to further grassland husbandry in the Corn Belt:

1. More studies are needed in which different cropping and livestock systems of farming are compared, the results to be considered from the standpoint of soil needs as they pertain to the interrelationships of soils-plants-animals.

2. As scientists and technicians we should attempt to improve the grassland acres to the point that they will be foolproof in all respects, and in all places, as a safe and nutritious feed for animals and as a thriving crop at all times.

3. In presenting rotations and livestock production data the emphasis should be on the sod-crop years. For example (Oats-S.—Meadow—Meadow —Corn).

4. We should develop 4-H and F.F.A. livestock projects for our youth in which the grassland aspects are emphasized and the soil-plant-animal relationships shown.

5. More studies are needed with each class of livestock to determine further the maximum limits of forage utilization in the Corn Belt.

All At One Lick

(*From page* 26)

7 acres of kudzu, 5 acres of alfalfa, and 4 acres of fescue and Ladino clover, or a total of 110 acres of grazing and hay.

Thirty-one acres in Classes I, II, and III, suitable for cultivation, were planned for crop rotations, including 16 acres of small grain and annual lespedeza, 8 acres of corn, and 7 acres of cotton. A woodland improvement program was worked out for 19 acres of woodland, three acres were designated for two fish ponds, and the remaining 4 acres were in house sites and garden.

After the farm had been selected and planned, the district supervisors lost no time in appointing a general steering committee, with Mr. Holsenbeck as chairman, and other committees to have charge of the program, concessions, sanitary arrangements, publicity, materials, machinery, fuel, safety, traffic, and finances. The supervisors themselves contributed $500 from district funds and agreed to underwrite other incidental expenses that could not be taken care of by contributions from other groups.

After the organization setup was completed, the supervisors entertained at a dinner in Winder all the members of the committees, the heads of all agricultural agencies in the state, and representatives of *The Atlanta Journal*, to discuss needed materials and services that might be contributed by various groups.

For each of the 15 fields on the farm, Soil Conservation Service tcehnicians made up a list of the main jobs and minor jobs to be done, and the types of equipment, number of man and machine hours, fertilizer, seed, fencing, posts, and other materials that would be needed to carry out the planned program in a single day.

Bert Robinson, cooperative conservationist of the Soil Conservation Service in Atlanta, was assigned to assist the supervisors in the promotion and to handle contacts in Atlanta. In addition to SCS technicians assigned to supervise the field work on the farm, the Georgia Extension Service and Forestry Department of the University of Georgia were designated to supervise the thinning operations and other forestry work to be done by machine-saw representatives.

As a result of meetings in Winder and Atlanta with state representatives of heavy and light equipment manufacturers, and a visit by equipment representatives in the Winder group to the farm to survey the situation, arrangements were made for the use of more

than a million dollars' worth of heavy and light equipment which took part in the demonstration.

Although it was a mechanized show, tremendous amounts of manpower also were needed in such jobs as constructing 2½ miles of new fence that were built during the day, hauling and handling the tons of fertilizer that were used, operating and servicing the equipment, and dozens of incidental jobs. In all, more than 700 people took part, including 300 G. I. trainees in agricultural classes who volunteered their services to assist in the huge face-lifting operation.

In one 24-acre field of rough cultivated land, where 8 acres of sericea, 8 acres of annual lespedeza, and 8 acres of corn were to be planted, 40 men were engaged in leveling, subsoiling, terracing, fertilizing, liming, and seeding the area. Involved in the various operations in this field were 17 wheel-type tractors, 3 heavy trac-type tractors, fertilizer distributors, lime spreaders, seeders, and planters.

The vast array of mechanized equipment, all of which was in place the night before and ready to go to work on its assigned job, included 72 wheel tractors, 28 trac-type tractors, 4 motor patrols, 4 terracing machines, 2 heavy subsoilers, and 6 truck lime spreaders, in addition to innumerable harrows, disc plows, whirlwind terracer, fertilizer distributors, planters, seeders, cultipackers, ditching equipment for drainage, and sprinkler equipment for irrigation demonstrations.

Forty-three tons of complete fertilizer, 10 tons of basic slag, 90 tons of lime, and 200 pounds of boron were put down during the day on pasture and cropland. Although only seasonal plantings could be made, seed used included 1,850 pounds of annual lespedeza, 500 pounds of sericea, 150 pounds of meadow fescue, 100 pounds of Dallis grass, 15 pounds of Ladino clover, 100 pounds of cottonseed, and 1 bushel of Tennessee-10 seed corn.

Additional contributions of seed for later planting included 1,200 pounds of ryegrass, 400 pounds of clover, 350 pounds of meadow fescue, 150 pounds of alfalfa, and 100 pounds of orchard grass.

The 2½ miles of new fence put up during the day required eleven 20-rod rolls of 32-inch high woven wire, twenty-seven 80-rod rolls of barbed wire, 700 cedar posts, and 12 heavy creosoted corner posts.

To round out the farm improvement undertaking a manufacturer who donated a new metal barn also provided culverts and pipe for the fish pond, and two paint companies which donated paint for the farm buildings also provided labor to do the painting job.

The Army Signal Corps at Ft. McPherson, Atlanta, furnished a complete communications system, including 32 loud speakers and 6 radio transmitters and receiving units set up around the farm, and provided men to operate it.

The State Highway Department reinforced bridges on roads leading to the farm to accommodate the heavy equipment. Three Winder oil companies furnished oil for refueling the equipment, and the district supervisors hired deputized guards to protect the equipment while it was on the farm.

Sponsors and other participants were protected against the possibility of an accident by a $5,000 to $10,000 liability and $1,000 property damage insurance policy, which the district supervisors secured at a cost of $250, less the commission donated by the agent.

But in spite of the huge crowd and the mighty array of mechanized equipment, not a single accident occurred. The only people with nothing to do were a doctor, a registered nurse, and an ambulance driver who were on hand in case of emergency.

In summing up the varied events of the Master Conservation Field Day at Winder, District Conservationist Dolvin commented:

"We're doing the same thing on a small scale on farms in soil conservation districts every day, but we wanted to show it to 'em all in one lick."

Once A Grandpa

(*From page* 5)

own wife all the more because of the knowledge that you let her bear the brunt of raising your own family, with too little aid from Dad.

Here are a few of the scenes you re-enact again and recall from the marvelous past:

You awake earlier than usual on a day when you wanted to rest, and something tells you that things are amiss. However, you find it's nothing to fret you unduly. The little girl has climbed on your bed and given your scanty locks a yank. Then your vision goes into eclipse momentarily. She sits on your face in a posterior condition calculated to dampen your enthusiasm.

You coax her to quit tugging at your legs while you shave, and send her after some favorite toy while you get into your pants. At breakfast she eats with spoon reversed, dribbling milk and water, jam and sundry other edibles; pours generous dashes of her drink on your toast; laughs and blows oatmeal and egg residues on your dressing gown; and wants "more" of everything and takes little of nothing.

Immediately thereafter, or perhaps sooner, she demands a little ozone and takes your hand in hers. You struggle with the "giggy" and button up her dress, place her in the driver's seat of the rakish little go-cart, and find instead that she prefers to walk and do the pushing herself. To make peace temporarily, you agree.

PRESENTLY, or even before that, she spies a mangy cat sneaking along in haste to escape infant attention. This animal must be identified and called to, and sometimes followed awhile until it seeks the doghouse for refuge. Thereupon, and even oftener, she glimpses a bright red cart down by the sand lot. She insists on being hoisted into it and having Grandpa pull her around the yard for an endless spell. To make it more realistic she suggests that all her dolls be toted out and seated in the vehicle. One by one she tosses them out when you are not looking backwards and these have to be retrieved—or else!

Luckily as you pass the sand lot for the fifteenth round a neighbor kid comes out with his fire engines and other accoutrements of juvenile jousting. This intrigues her no end. So you abandon the cart, park the giggy, and let the grandchild investigate the situation while you sprawl in weary resignation on the freshly painted park bench.

JUST as you get your eyes in focus enough to attempt to scan the newspaper headlines, a fracas of the fourth dimension begins in the playground. The little tots are troubling each other again. The right to prestige is being violated by somebody. In other words, there is a fight going on over the fire engine, and the umpire is in for a rough time of it.

You hold your temper in leash and admonish yourself that neither of these hopefuls is yet at the noble age of reasoning power—which is to some extent inherited, as you never were very good at reasoning well yourself. Moreover, neither is strong enough to inflict mortal injury and there is no championship belt at stake. However, it gets all fixed up finally, most always in favor of the girl baby—and you wonder how much longer it is to lunch and nap time. You are sadly in need of both!

Well, such are the memories. They go on all day. They give you a new lease on life, but sometimes you wonder if anybody might like to subrent it awhile, to give you a brief period of repose and refreshment.

There are other less lightsome moments too, in cases of sudden infant illness, when your memory goes back in sympathy to other times and former

years. But thanks to wise counsel vouchsafed these days by able practitioners, the fear of old fevers and the specter of tragedy do not usually hold the same degree of terror as of yore. Your advice as a Grandpa is seldom sought in the sick room, in contrast to the homeopathic nostrums and simple-minded remedies that oldsters used to insist should be resorted to in every infant illness.

In my early youth many of us were bothered with "worms." One of the mainstays advocated by troubled and anxious Grandpas was either bought at the drug store sight unseen, or else happily secured at a bargain from the current Indian Medicine Show. Chief Unkumpapas would unwrap his mail-order blanket and disclose a bundle of mysterious plasters or sell you a few bottles of "Pain Paint." One of the favorite cure-alls administered to small boys riddled with worms was a pink pill which a full grown stallion would find hard to swallow. I, too, suffered these needless torments that befell me as I tossed on a red-hot sheet, and I vowed and vummed then and there never to prescibe or dose my offspring with such useless concoctions.

I am persuaded that one of the big reasons why the life expectancy of infancy is extended lies in the wise course followed by Grandpas (and Grandmas too) of leaving affairs of the alimentary tract to trained physicians and nurses. This may be a negative virtue, but it has much to commend it.

IN a serious vein, child psychology rates four possessions of childhood as indispensable. Grandpas ought to observe them too. They are (1) Security; (2) Affection; (3) Responsibility; (4) New Experiences.

Grandpas have done as much as they could perhaps to furnish the first requisite—security. By dint of raising one family well and having constructive programs of work and education, plus some accumulated savings, the oldsters have contributed well to security and stability of the offspring. This example usually renews itself in the children so they themselves are able and willing to provide financial security and family stability to the grandchildren. In a few cases, of course, Grandpa has to shell out himself to provide that security for the newcomers.

Affection is not just gooey-gooey sentimentality. It's not all kisses and honey. It also requires self-restraint and poise.

PARENTS or Grandparents who "holler" around the house and raise Ned in the neighborhood—drunk or sober—are undermining affection, even though they dish it out in a sticky mess some of the time. The Grandpas who never had any control of their emotions and savage mean streaks are not to be trusted with grandchildren any farther than you can swing an elephant by the tail.

A Grandpa who treats his newly arrived tot with mushy affection and fails to teach it a sense of responsibility as it grows and learns is just repeating old mistakes. Self-reliance is something that every child must be taught, and the doting Grandsire who tries to act and think for the kid continually is missing a bet both ways.

When it comes to showing them new wrinkles and helping them to have new experiences of value in after-life, the successful Grandpa surely has his best innings. He can go right back himself while doing it and learn a lot that he never knew or points he overlooked. He can ask silly questions at the zoo with safety, as long as he has this ripe excuse. He can brag about famous baseball pitchers he has seen while he lets the grandchild see the newest hero of the league in action. He can study music and language and art and games of skill along with his growing offspring, and benefit equally with the child itself.

Grandpas no longer linger in the w. k. armchair ensconced in the dingy chimney corner. They are more alert

and modern, more pushing and lively, more ambitious and keen. They have to be, of course, to keep quick step with this fast era. Maybe it's not so good for the guy with a weak circulation or rheumatism, but let him use his judgment as to his bodily ability to cope with the kid, so long as his mind is not closed and his heart is not atrophied.

I expect some day to be a Grandpa again—maybe a couple of times more. It's beyond my control in any event and I've nothing to say about it, one way or the other. All I can do is to stand by and look smug and proud. I'd like very much to stand around here on the edges of things watching them grow and develop for a long time to come. If they can take it, so can I.

I often think how much a chap misses when he never gets to be a regular, bona fide Grandpa. The only one of that ilk who can be made to bear the brunt of all the blame for this is the geezer who was too tight to get married. You can't blame the married fellows every time for not having grandchildren. There are too many obvious reasons for letting them off.

To grow old and lonely without any grandchild to pester you and keep you wide awake when you want to slumber —that's a misfortune. That's why I am tickled so much with the circumstanaces in which I find myself. I don't know as I would trade with the fortunate fellow who claims a dozen or more grandchildren, however. It's quality, not quantity that counts most with me.

And finally, lest the chaps who have no prospects of being Grandpas get too discouraged concerning the matter, we can remind them of countless welfare projects and educational and moral benefits engineered and paid for by gallant guys whose interest in young folks springs from sociological rather than biological roots. In other words, your attitudes and actions toward youth can be "grand" to a high degree, even if you've never been a "Pa."

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Circulars

Tomatoes (General)
Asparagus (General)
Vine Crops (General)
Sweet Potatoes (General)
Better Corn (Midwest) and (Northeast)
The Cow and Her Pasture (General)

Reprints

N-9 Problems of Feeding Cigarleaf Tobacco
F-3-40 When Fertilizing, Consider Plant-food Content of Crops
S-5-40 What Is the Matter with Your Soil?
I1-12-42 Wartime Contribution of the American Potash Industry
J-2-43 Maintaining Fertility When Growing Peanuts
Y-5-43 Value & Limitations of Methods of Diagnosing Plant Nutrient Needs
FF-8-43 Potash for Citrus Crops in California
A-1-44 What's in That Fertilizer Bag?
H-2-44 Efficient Fertilizers for Potato Farms
AA-8-44 Florida Knows How to Fertilize Citrus
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The members of an exclusive hunt club decided to hold a fox hunt, and instructed the members to bring only male dogs. However, one influential member owned only a female, and she was allowed to run with the pack.

The morning of the hunt they followed the dogs for an hour, then lost them completely. One of the hunters saw a farmer in a field and questioned him:

"Have you seen anything of a pack of dogs and a fox?"

"Sure, just a minute ago. They were going that way."

"What were they doing?"

"Wal," said the farmer, "the last I seen, the fox was running fifth."

* * *

Great Grandmother Olson studied the newborn babe with obvious satisfaction. "If my memory doesn't fail me," she chuckled, "It's a boy."

* * *

THEY SEPARATED

A hillbilly, seeing a motorcycle rider going along the road below the house (and never having seen an automobile or motorcycle before), grabbed his rifle and took a shot at it.

His wife called out: "Did you git the varmint, Zeke?"

"No," he said, "I didn't kill it. I can still hear it growling, but I sure made it turn that man loose."

Johnny and Mary went into the country to pick wild flowers. Mary's mother went with them, so they picked wild flowers.

* * *

WHO CARES?

A would-be soap-box orator who had reached the argumentative stage sat down next to a clergyman in a street car. Wishing to start something, he turned to the clergyman and said:

"I won't go to heaven, for there ain't no heaven."

The expected rise was not forthcoming.

"I say there ain't no heaven. I ain't goin' to heaven," he shouted.

The clergyman replied quietly, "Well, go to hell, then, but be quiet about it."

* * *

It was in a stately English club. The members always talked in a whisper and never turned their heads. This custom was broken the other day when an English Lord called to the butler in a normal tone, "Please remove Plushbottom, he's been dead three days."

* * *

"I know my girl's faithful. I could trust her with fifty guys."

"Fifty? Sure. But how about with one alone?"

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Authorities have recognized that the depletion of Boron in soil has been reflected in limited production and poor quality of numerous field and fruit crops.

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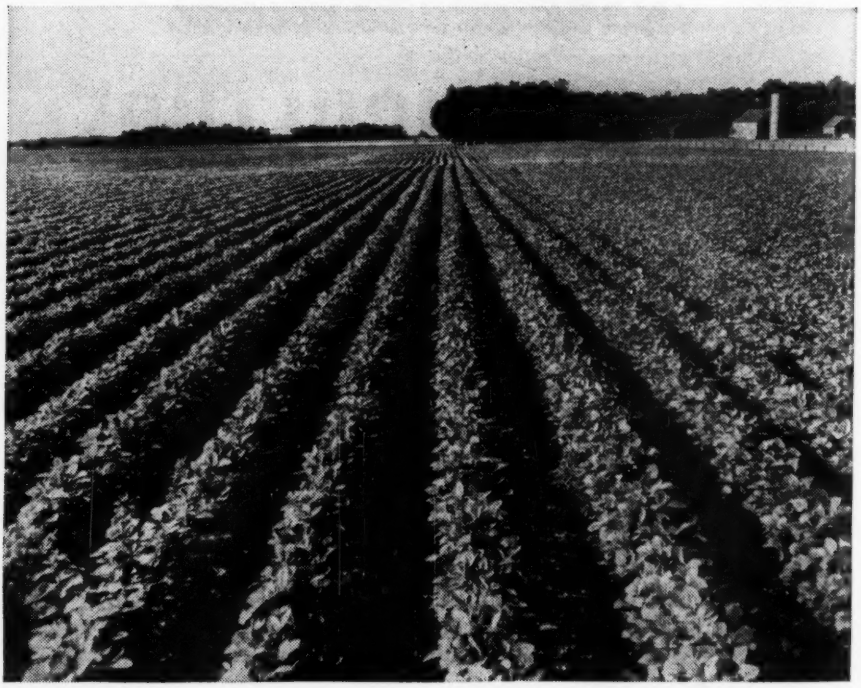

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